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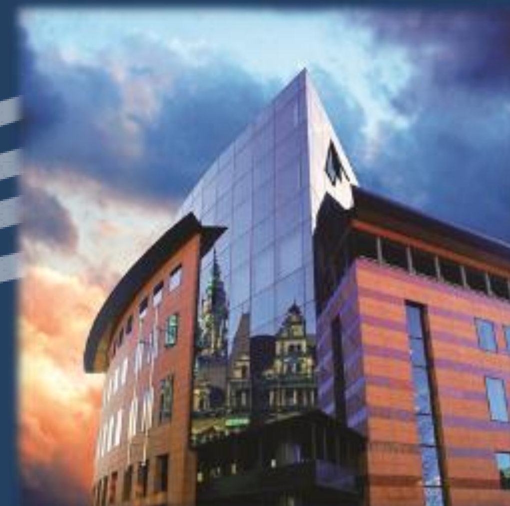
Daikin Altherma
Install & Commissioning

Participant Guide

Daikin Altherma™





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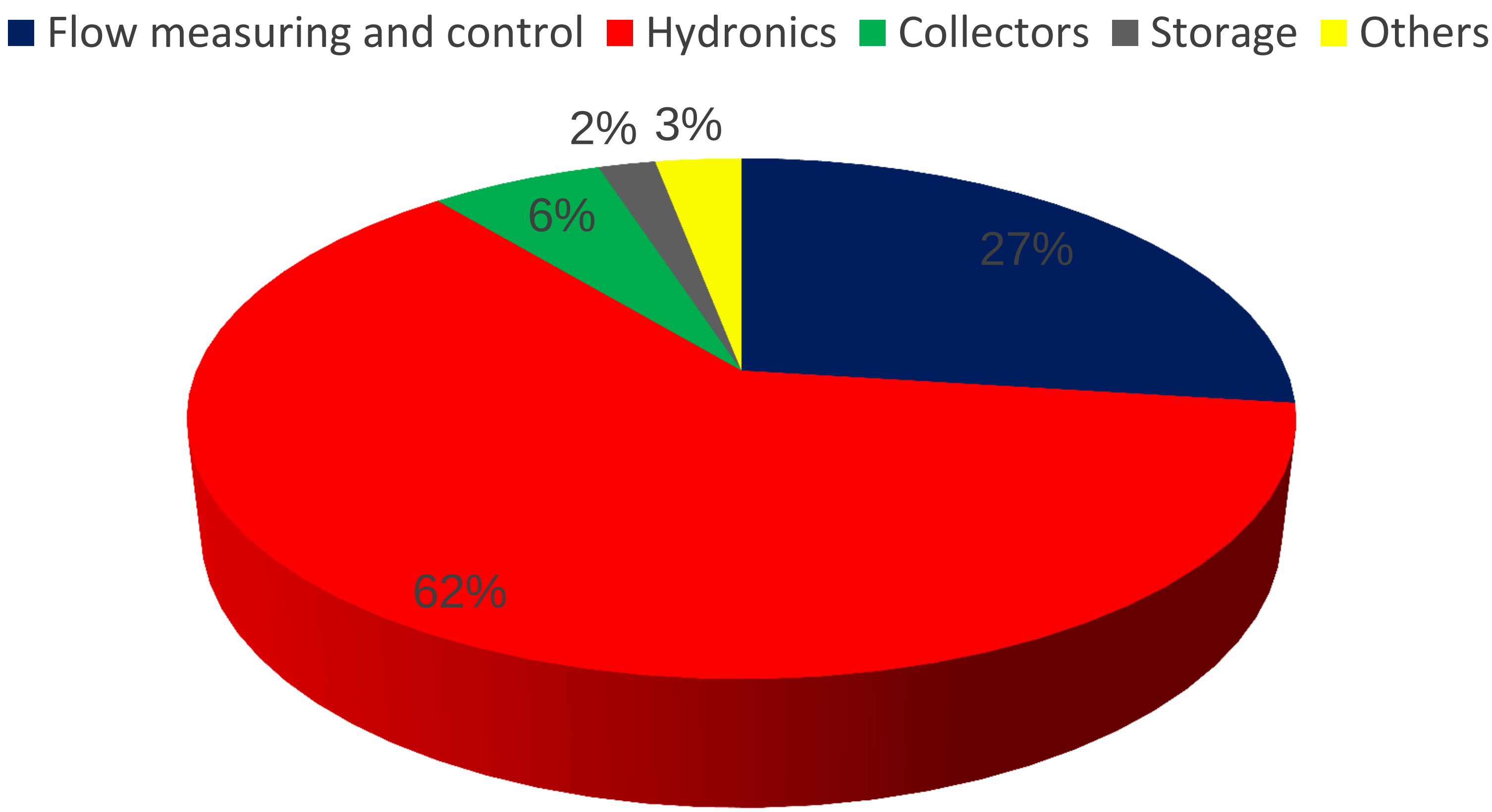
Pre-Installation Planning

Why we talk about Pre-Planning – Assembly Errors



Source:

Planning and Installing Solar Thermal Systems. A guide for Installers, architects and engineers (copyright 2010).

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Expanding on "A Good Design" principle

- Step One - End user interview
  - What are their needs and expectations of a HVAC systems.
  - How much hot water do they use
  - Best time to start a Daikin Altherma Check List.
- Step Two - Heat Loss/Heat Gain Calculations
  - Manual J / Manual N
  - Keep filling in Daikin Altherma Check List
- Step Three - Altherma System Configuration
  - Mono-Valent, Mono-energetic, Co-valent, Bi-valent
- Step Four - Equipment Style Selection
  - MonoBloc, Hydrobox, Water Tank, Solar
- Step Five - Daikin Altherma Selection Software
  - Run selection software to select optimum Altherma model for application
- Step Six - System Layout & Design
  - Decide on type/style of heat emitter; radiant, fan coil, convector, other
  - Layout and size piping & ductwork
- Step Seven - Installation & Commissioning
  - Install & Commissioning using Best Practices and Daikin supplied support materials
  - Fill out and send in Commissioning Report

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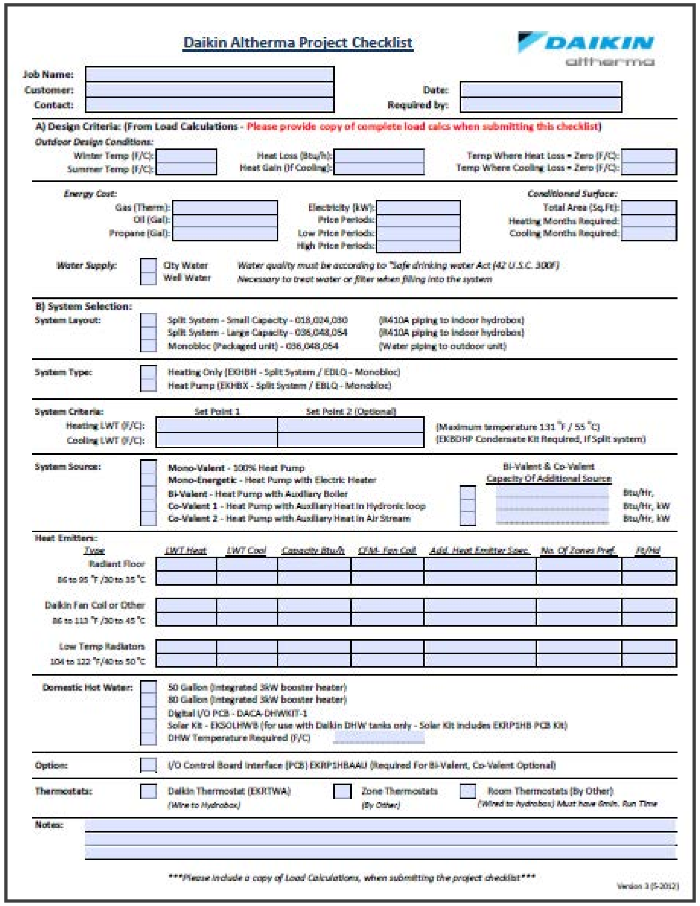
Step One – Interview End User

- Talk to the end user and find out what temperatures they are comfortable at.
- Is anyone sensitive to humidity or moving air?
- Are they happy with their current system, why?
- Does their current system keep all areas warm and cool enough in each season throughout the year? Any damp areas?
- What type of heating system is preferred? Some have never been asked this question!
- Tell them about all the possibilities with using a hydronic system; radiant, warm air, baseboard, fan coil, panel, etc:.
- Would they like to have certain areas controlled by their own thermostat? Explain zoning options like breaking the system up by areas, rooms, floors, other?
- How much domestic hot water do they use?
- Have they run out, when?
- Do they have large tubs?
- Do they like to entertain large groups?
- Start keeping track of job information using the Product Check List.



Daikin Altherma Project Checklist

DAIKIN altherma

Job Name:
Customer:
Contact:
Date:
Required by:

A) Design Criteria: (From Load Calculations - Please provide copy of complete load calcs when submitting this checklist)

Outdoor Design Conditions:
Winter Temp (F/C):
Summer Temp (F/C):
Heat Loss (Btu/h):
Heat Gain (If Cooling):
Temp Where Heat Loss = Zero (F/C):
Temp Where Cooling Loss = Zero (F/C):

Energy Cost:
Gas (Therm):
Oil (Gal):
Propane (Gal):
Electricity (kW):
Price Periods:
Low Price Periods:
High Price Periods:

Conditioned Surface:
Total Area (Sq.Ft):
Heating Months Required:
Cooling Months Required:

Water Supply: City Water / Well Water
Water quality must be according to "Safe drinking water Act (42 U.S.C. 300F)
Necessary to treat water or filter when filling into the system

B) System Selection:

System Layout:
Split System - Small Capacity - 018,024,030 (R410A piping to indoor hydrobox)
Split System - Large Capacity - 036,048,054 (R410A piping to indoor hydrobox)
Monobloc (Packaged unit) - 036,048,054 (Water piping to outdoor unit)

System Type:
Heating Only (EKHBH - Split System / EDLQ - Monobloc)
Heat Pump (EKHBX - Split System / EBLQ - Monobloc)

System Criteria:

	Set Point 1	Set Point 2 (Optional)
Heating LWT (F/C):		
Cooling LWT (F/C):		

(Maximum temperature 131 °F / 55 °C)
(EKBDHP Condensate Kit Required, If Split system)

System Source:
Mono-Valent - 100% Heat Pump
Mono-Energetic - Heat Pump with Electric Heater
Bi-Valent - Heat Pump with Auxiliary Boiler
Co-Valent 1 - Heat Pump with Auxiliary Heat in Hydronic loop
Co-Valent 2 - Heat Pump with Auxiliary Heat in Air Stream

Bi-Valent & Co-Valent
Capacity Of Additional Source
Btu/Hr,
Btu/Hr, kW
Btu/Hr, kW

Heat Emitters:

Type	*LWT Heat*	*LWT Cool*	*Capacity Btu/h*	*CFM- Fan Coil*	*Add. Heat Emitter Spec.*	*No. Of Zones Pref.*	*Ft/Hd*
Radiant Floor 86 to 95 °F /30 to 35 °C							
Daikin Fan Coil or Other 86 to 113 °F /30 to 45 °C							
Low Temp Radiators 104 to 122 °F/40 to 50 °C							

Domestic Hot Water:
50 Gallon (Integrated 3kW booster heater)
80 Gallon (Integrated 3kW booster heater)
Digital I/O PCB - DACA-DHWKIT-1
Solar Kit - EKSOLHWB (for use with Daikin DHW tanks only - Solar Kit includes EKRP1HB PCB Kit)
DHW Temperature Required (F/C)

Option: I/O Control Board Interface (PCB) EKRP1HBAAU (Required For Bi-Valent, Co-Valent Optional)

Thermostats:
Daikin Thermostat (EKRTWA) *(Wire to Hydrobox)*
Zone Thermostats *(By Other)*
Room Thermostats (By Other) *(Wired to hydrobox) Must have 6min. Run Time*

Notes:

****Please include a copy of Load Calculations, when submitting the project checklist****

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Step Two – Heat Loss/Heat Gain Load Calculation

- Every good heating and air conditioning system design starts with a proper heat loss heat gain calculation.
- There are many software programs available, all have a small learning curve. First 2 or 3 are the hardest. Just do it!
- Industry accepted standards for load calculations are Manual J for residential applications and Manual N for commercial applications
- Buildings change over the years due to upgrades; insulation, windows and doors, internal gains
- Using rule of thumb methods or model numbers from previous equipment for sizing equipment is very inaccurate
- Don't add fudge during load calculations, Manual J/N already has enough built in….

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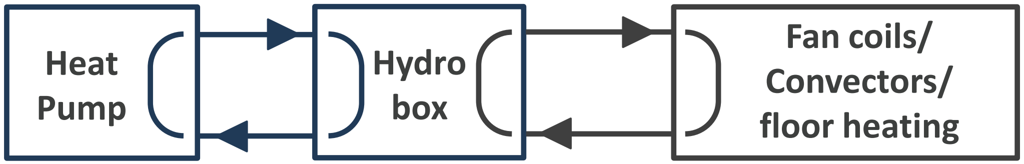
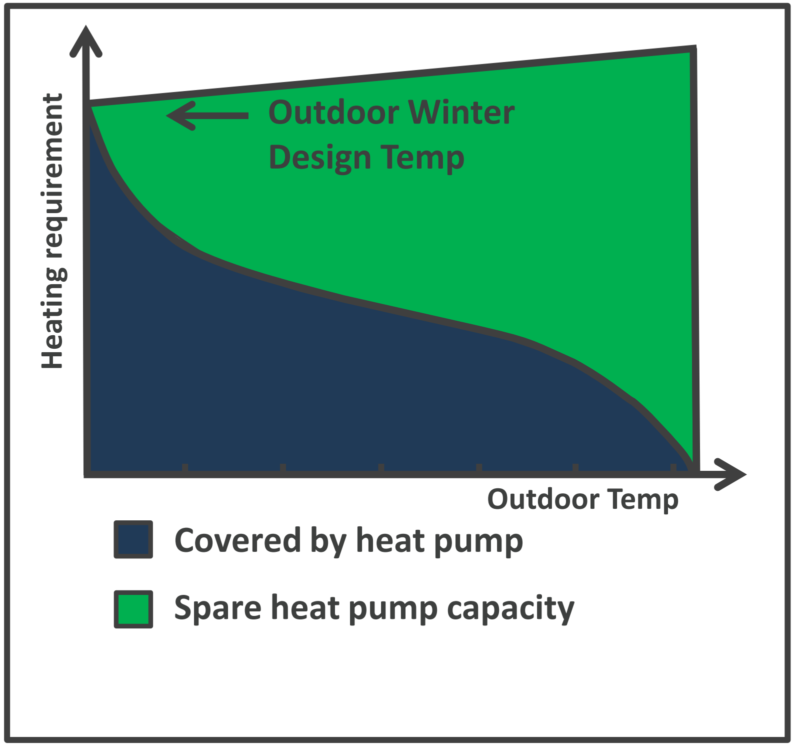
Step Three – Altherma System Configuration – Mono-valent



- Uses heat pump energy only
- Ideal for new construction (i. e. Net Zero designs, deep energy retrofits)
- 100% heat pump coverage: higher investment cost heat pump



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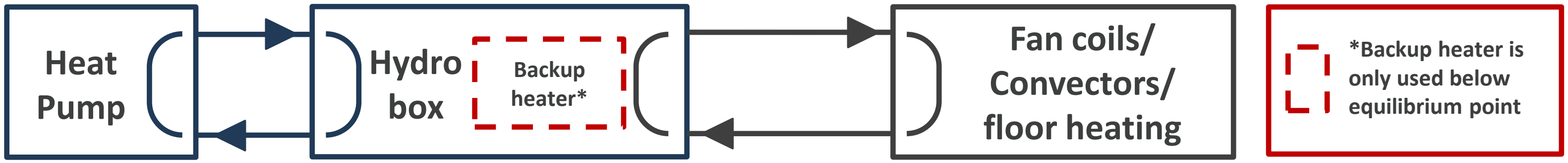
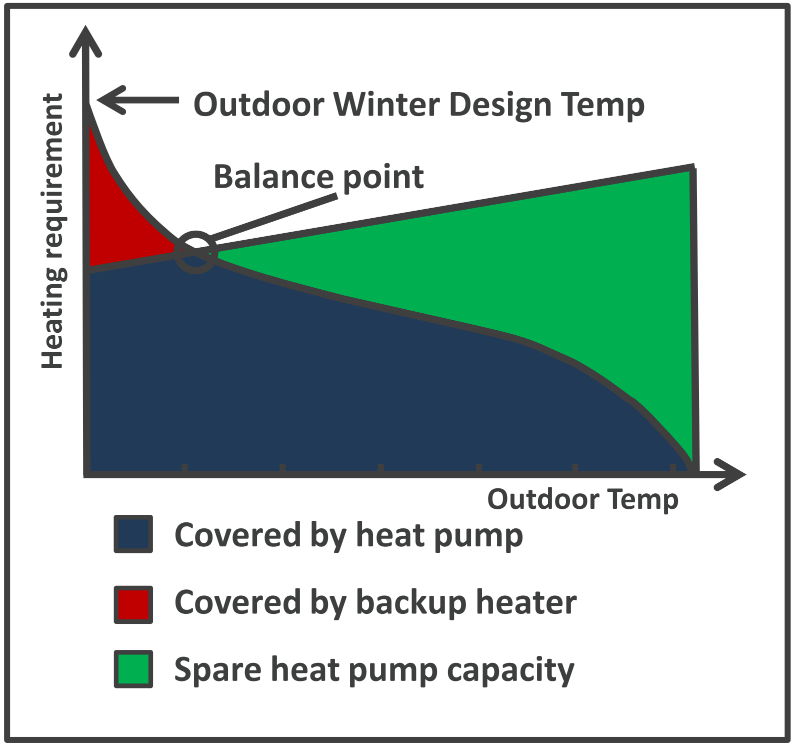
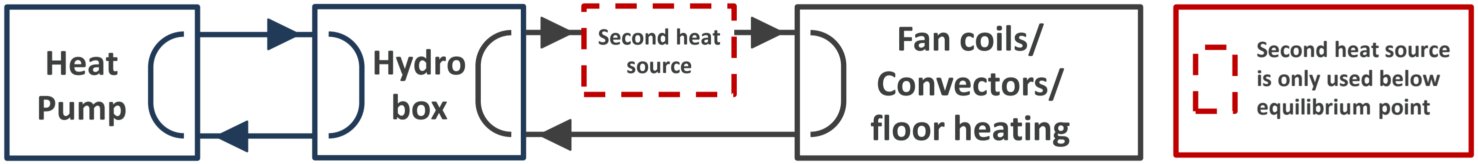
Step Three – Altherma System Configuration – Mono-energetic



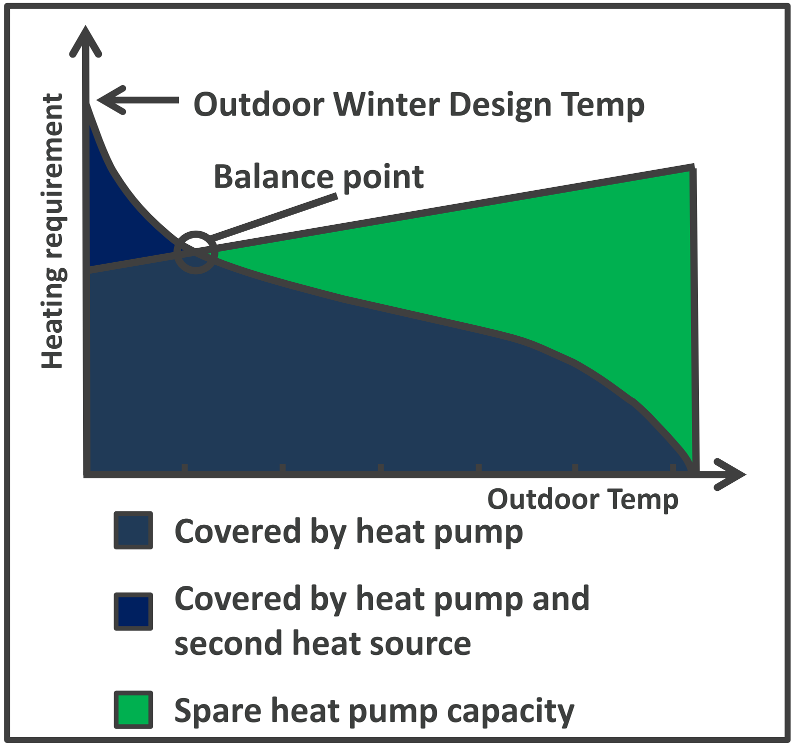
- Uses heat pump energy with backup electric heater
- Ideal for new construction
- Best balance between investment cost and running costs



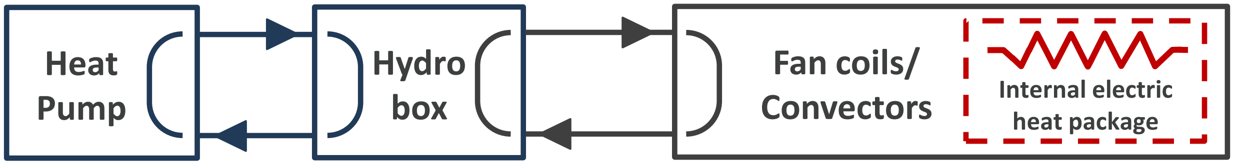
Step Three – Altherma System Configuration – Co-valent Option 1



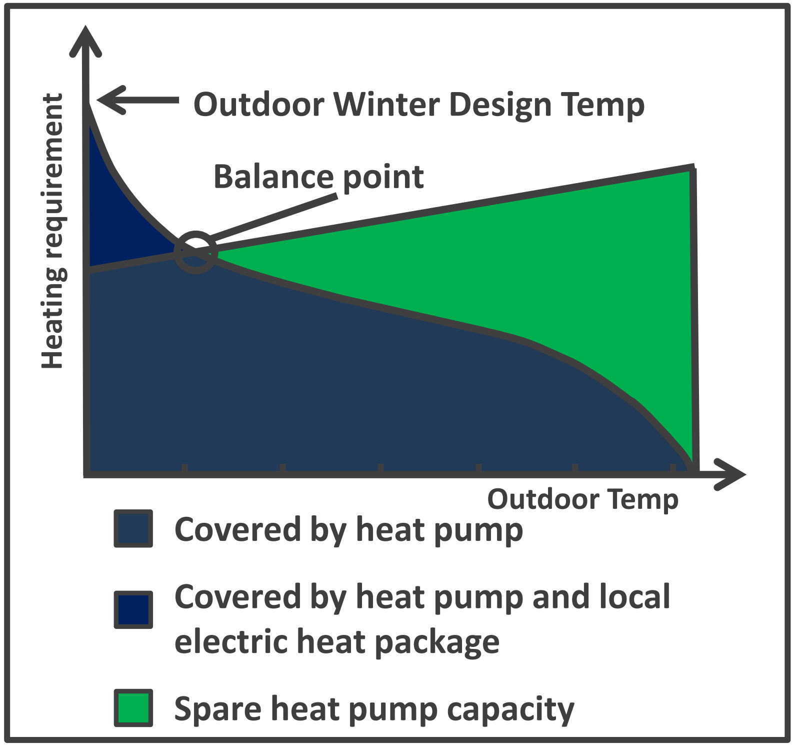
- Uses heat pump energy and second heat source
- Second heat source can be electric, oil or gas boiler
- Ideal for refurbishment/upgrade



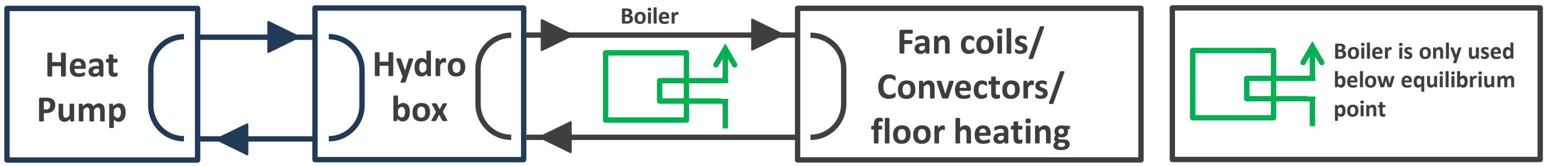
Step Three – Altherma System Configuration – Co-valent Option 2



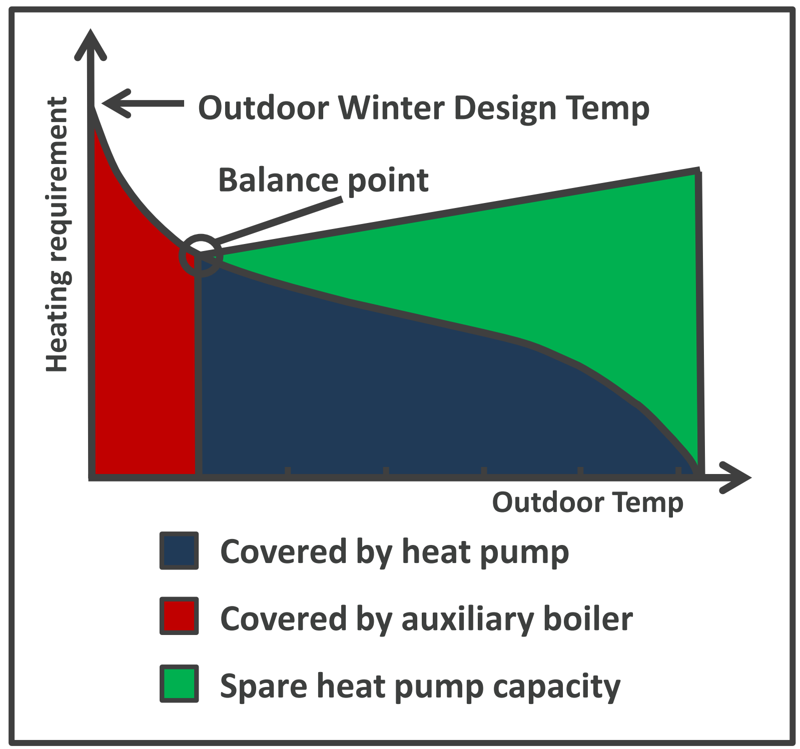
- Uses heat pump energy with local electric heat packages
- Electric packages can be easily staged by room thermostats
- Good balance between investment cost and running costs



Step Three – Altherma System Configuration – Bi-valent



- Uses heat pump energy with auxiliary boiler
- Ideal for refurbishment/upgrade
- Boiler can be, electric, oil or gas
- Once balance point is reached, heat pump shuts down and auxiliary boiler starts



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Step Four – Equipment Style Selection

- Heating Only
- Heating & Cooling (reversible)
- Split system (hydrobox)
- MonoBloc
- Fan Coil
- Water tank
- Solar for domestic

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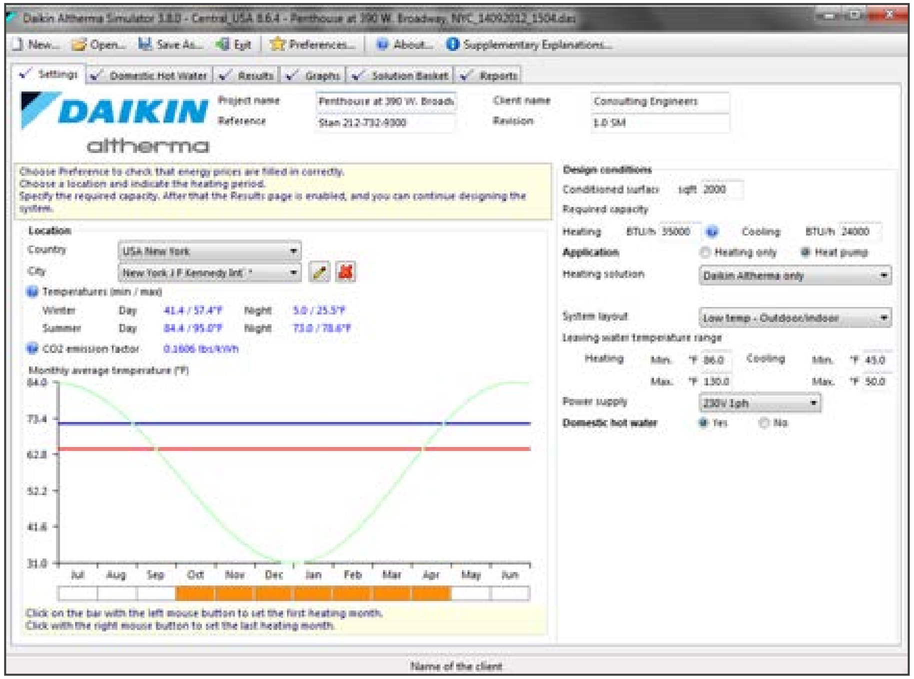
Step Five – Daikin Altherma Selection Software

- The selection software can help you properly select the exact units for your application.
- Software results are only as good as the information provided
- Accurate information in = Accurate information out
- Software will let you try different combinations
- Better the information, the more accurate the selection, est. fuel calculations and
- Field Settings Report for use in equipment commissioning will be.



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Step Six – System Layout & Design

- What type of heat emitters will be used or will there maybe a combination of different styles and temperature requirements
- Make sure heat emitters meet BTU requirements from load calculations

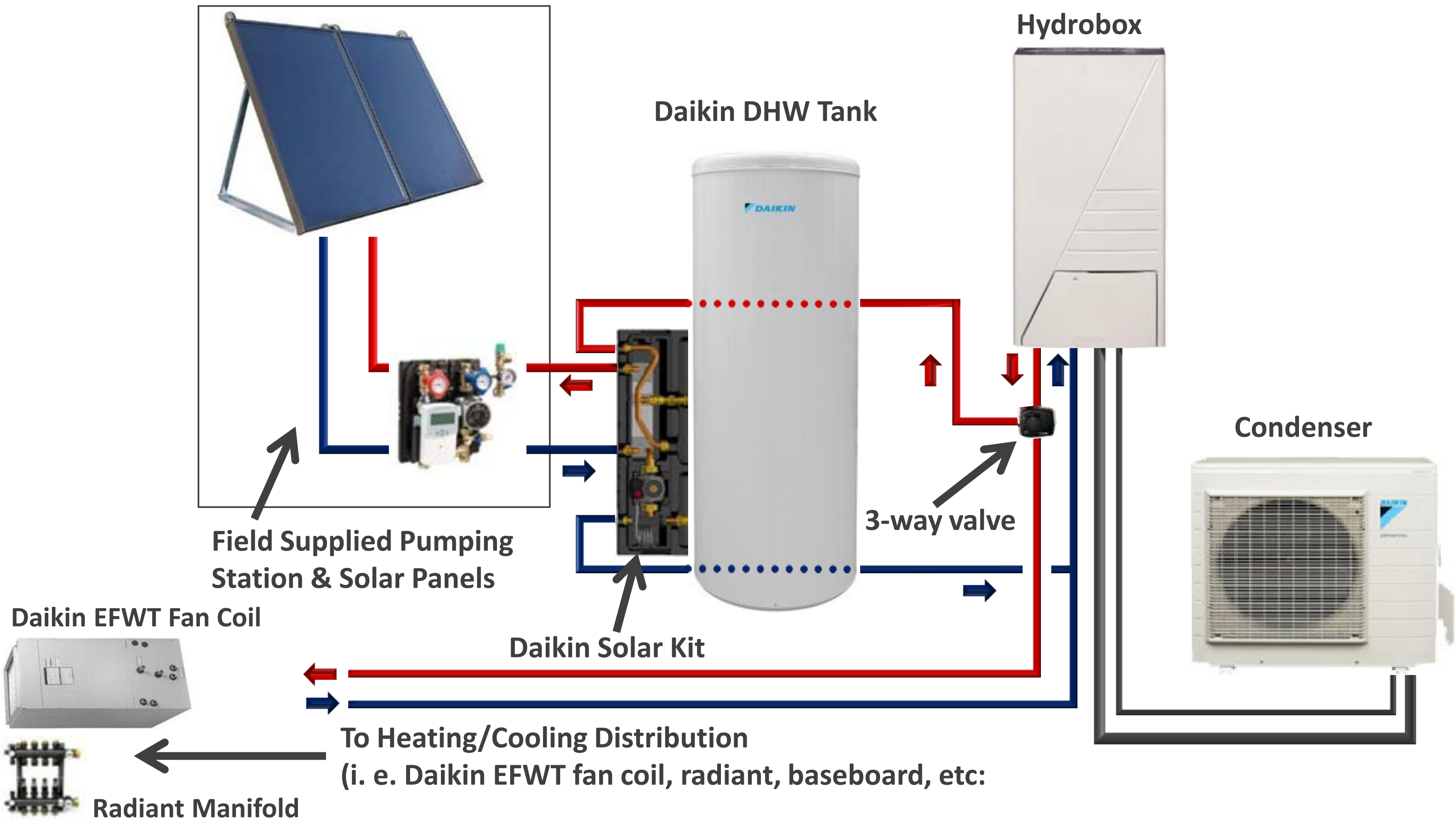
Recommended Altherma leaving **Heating** water temperature (LWT) selections conditions:

Radiant Floor: 86°F/30°C to 95°F/35°C
Fan Coil Units: 86°F/30°C to 113°F/45°C
Fan Convectors: 104°F/40°C to 122°F/50°C

Recommended Altherma leaving **Cooling** water temperature (LWT) selections conditions:

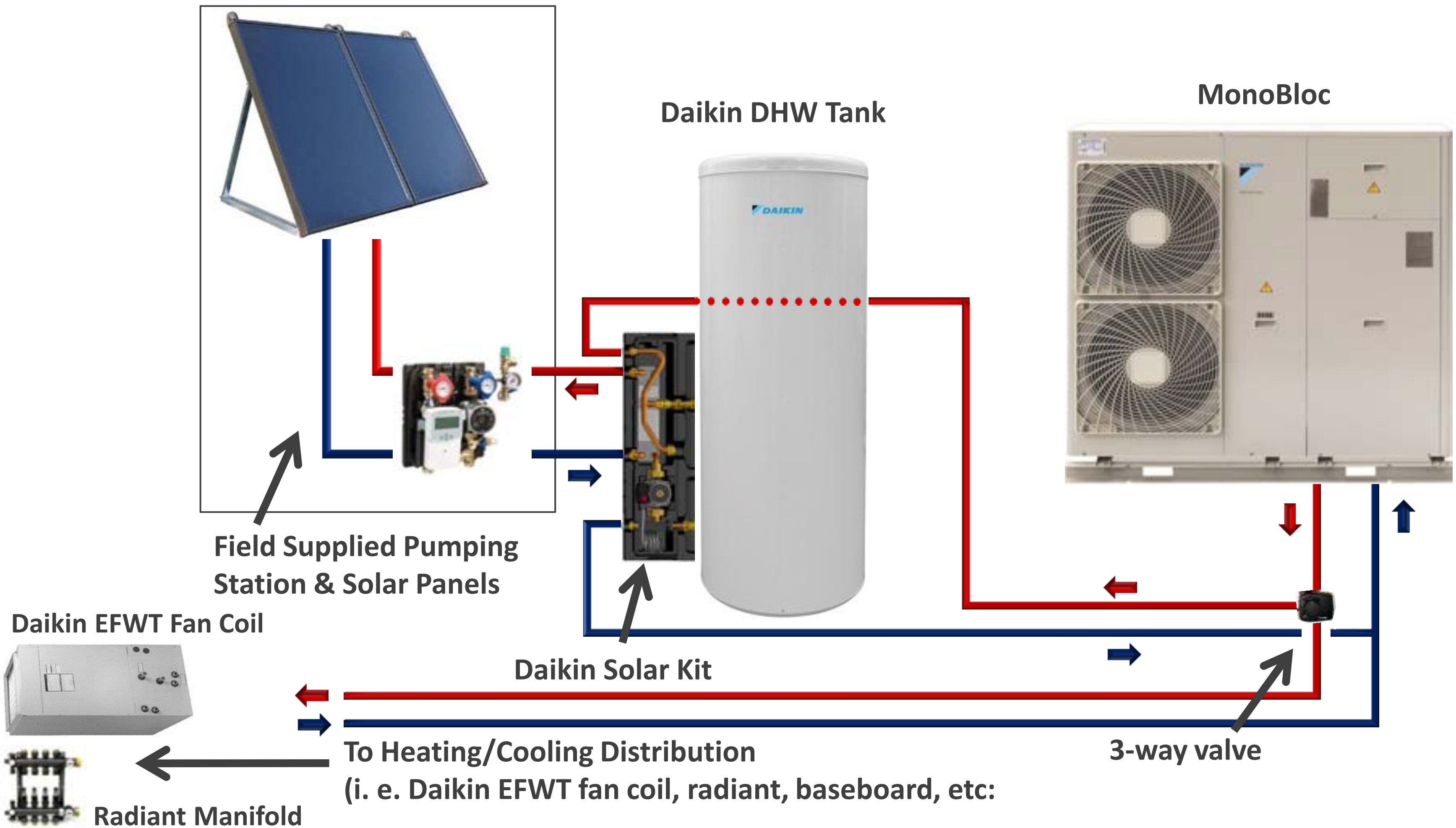
Fan Convectors: 41°F/5°C to 55°F/12°C

Step Six – System Layout & Design (cont.) – Split System Installation



NOTE: Drawing for reference only.

Step Six - System Layout & Design (cont.) - MonoBloc Installation



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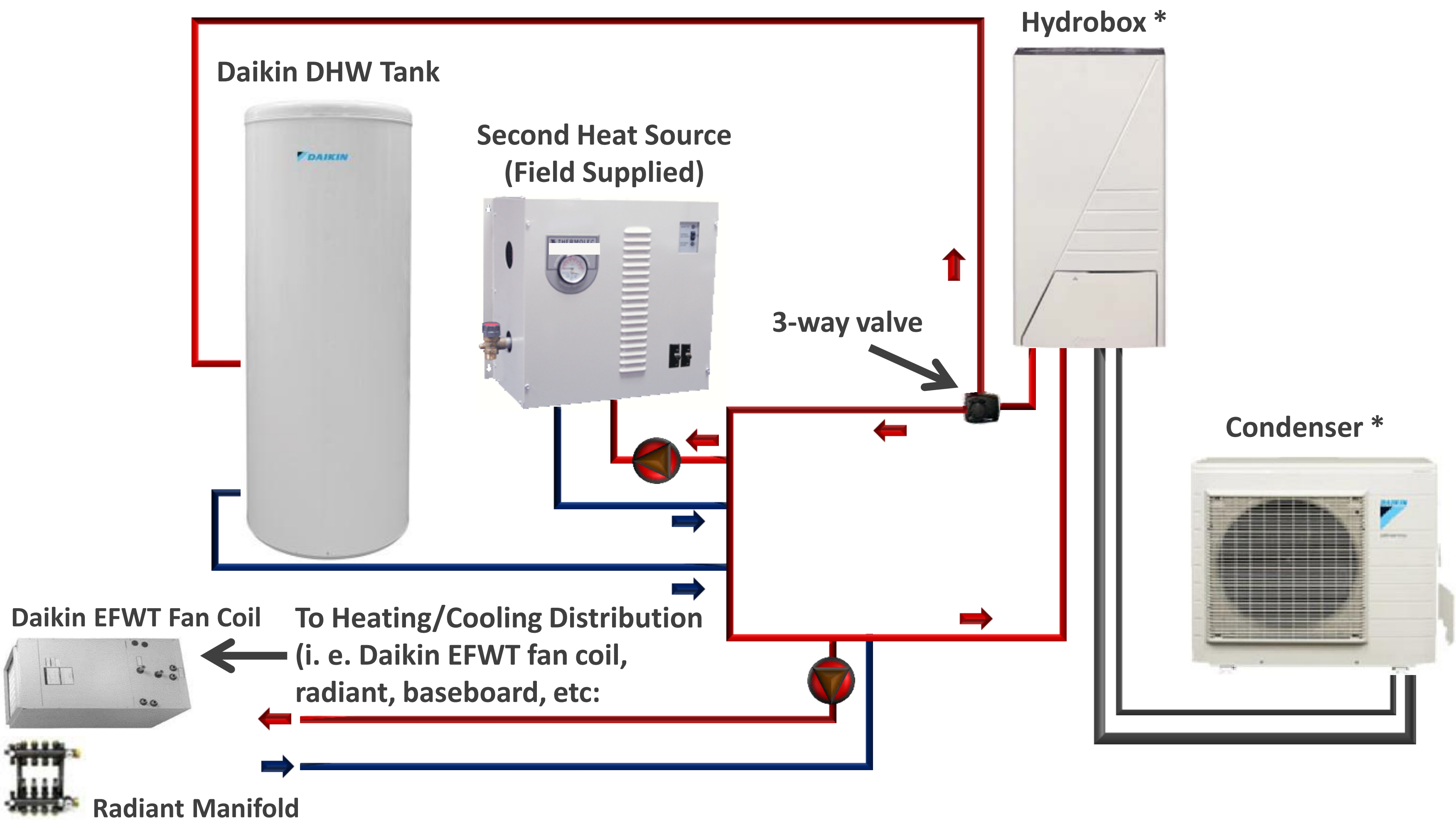
NOTE: Drawing for reference only.

Step Six - System Layout & Design (cont.) - Split System Co-valent Parallel Piping



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NOTE: Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc.

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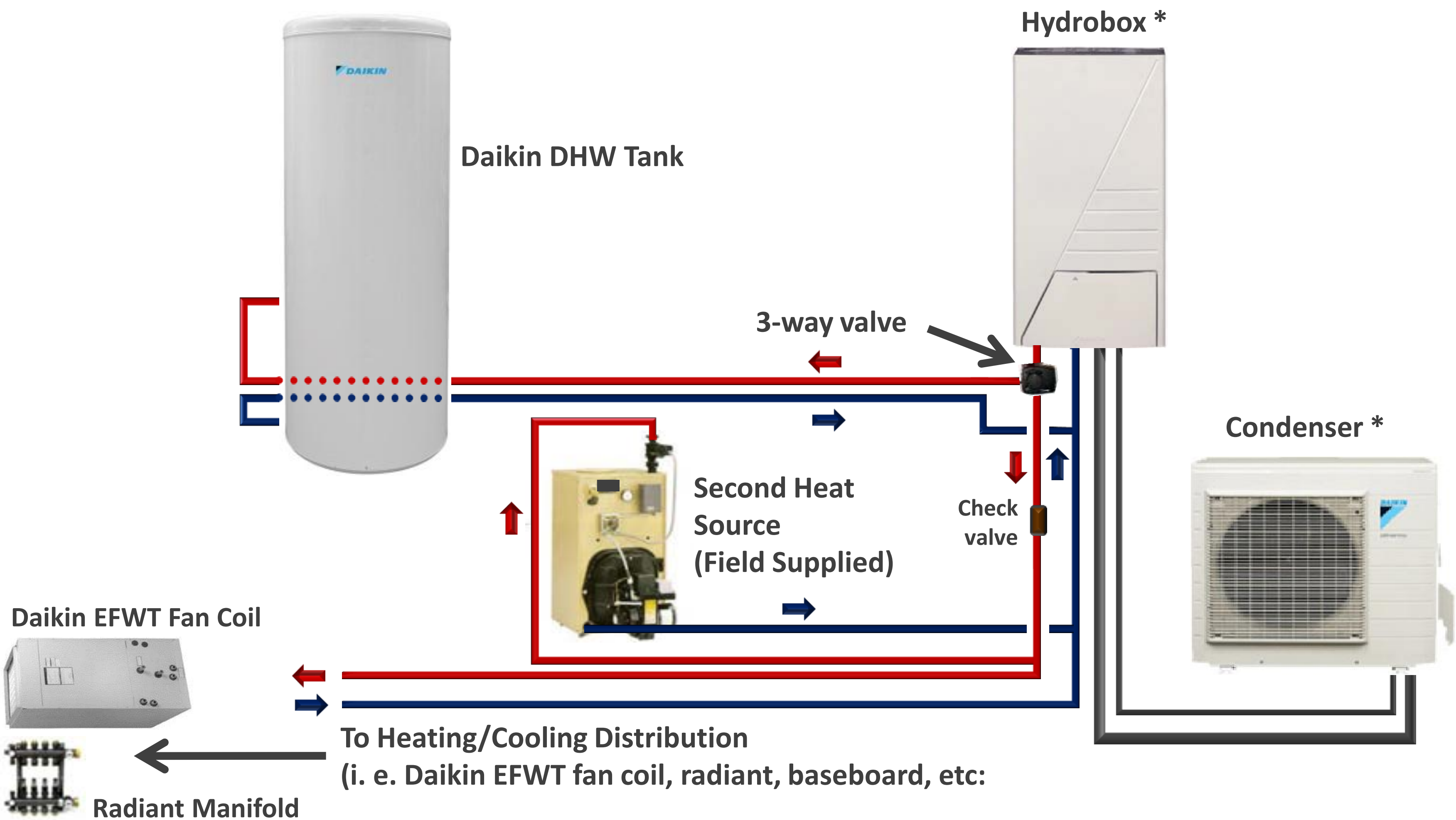
Step Six - System Layout & Design (cont.) - Split System - Bi-valent Parallel piping



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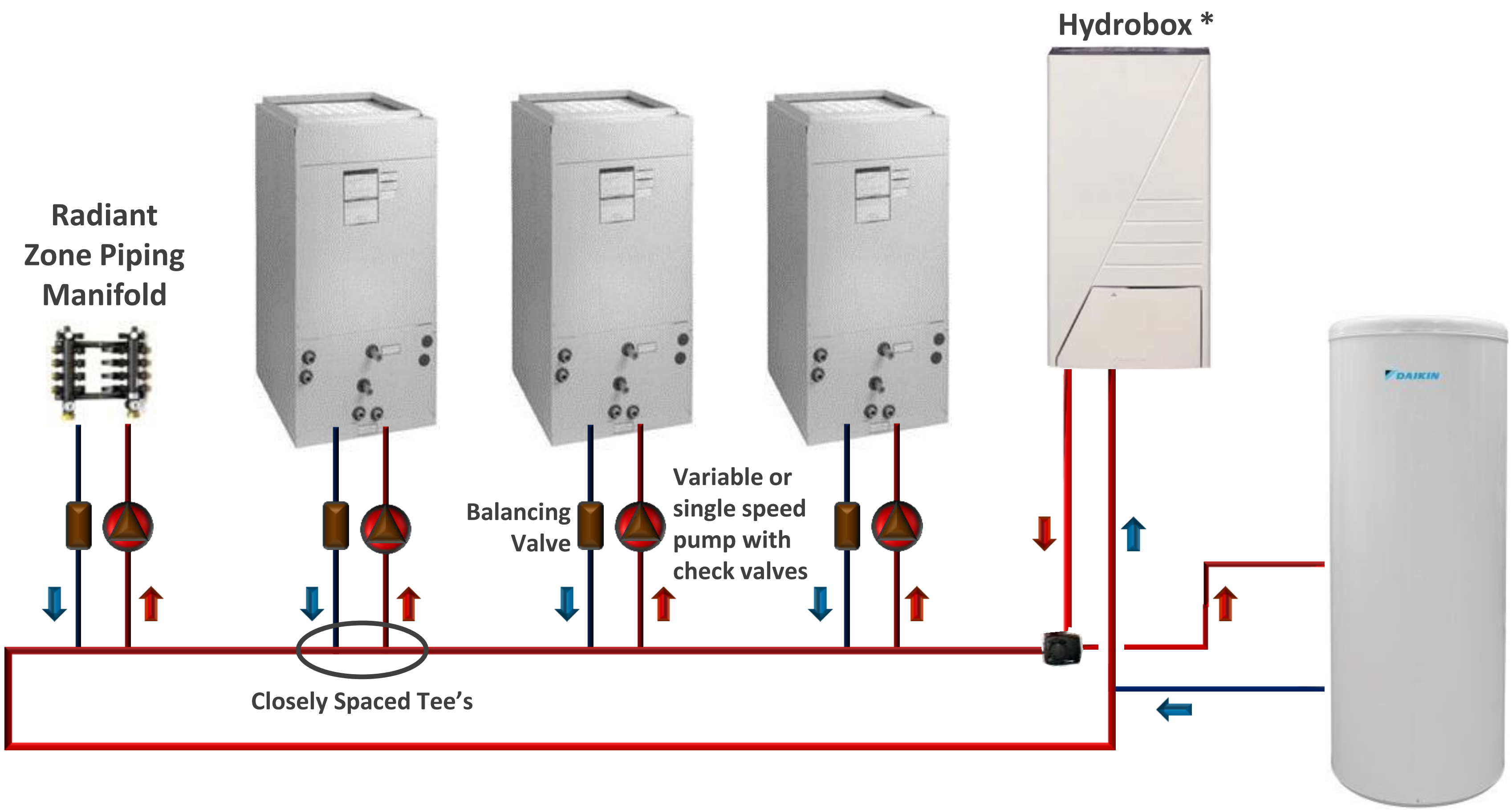
NOTE: Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc.

Step Six - System Layout & Design (cont.) - Multiple Fan Coil with Radiant & DHW



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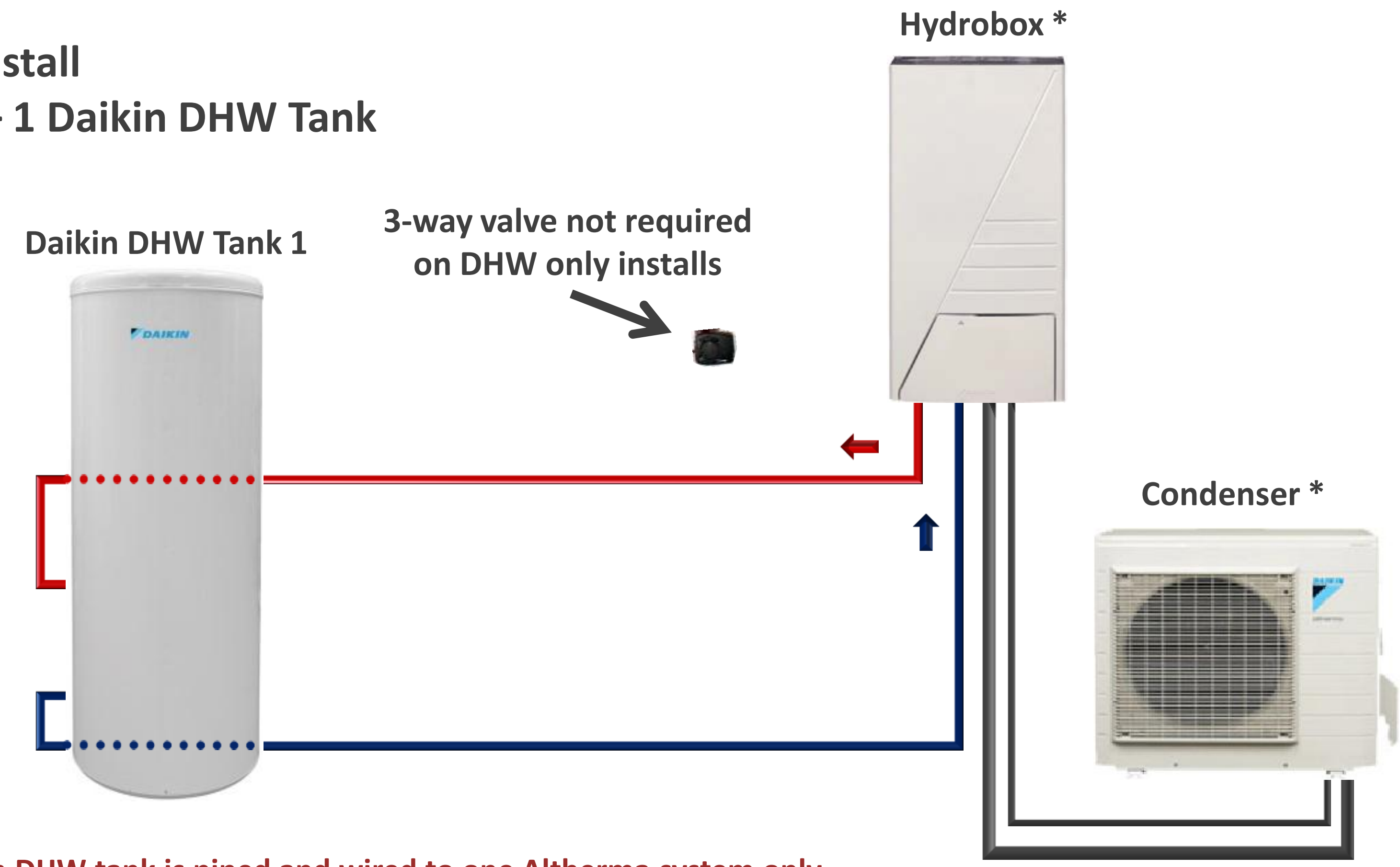
NOTE: Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc.

Step Six - System Layout & Design (cont.) - DHW Heat Exchanger Only

DHW Only Install
1 Altherma – 1 Daikin DHW Tank



NOTES:

- Each Daikin DHW tank is piped and wired to one Altherma system only.
- Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc. Relief valve, BSP/NPT adapters & isolation valves not shown.

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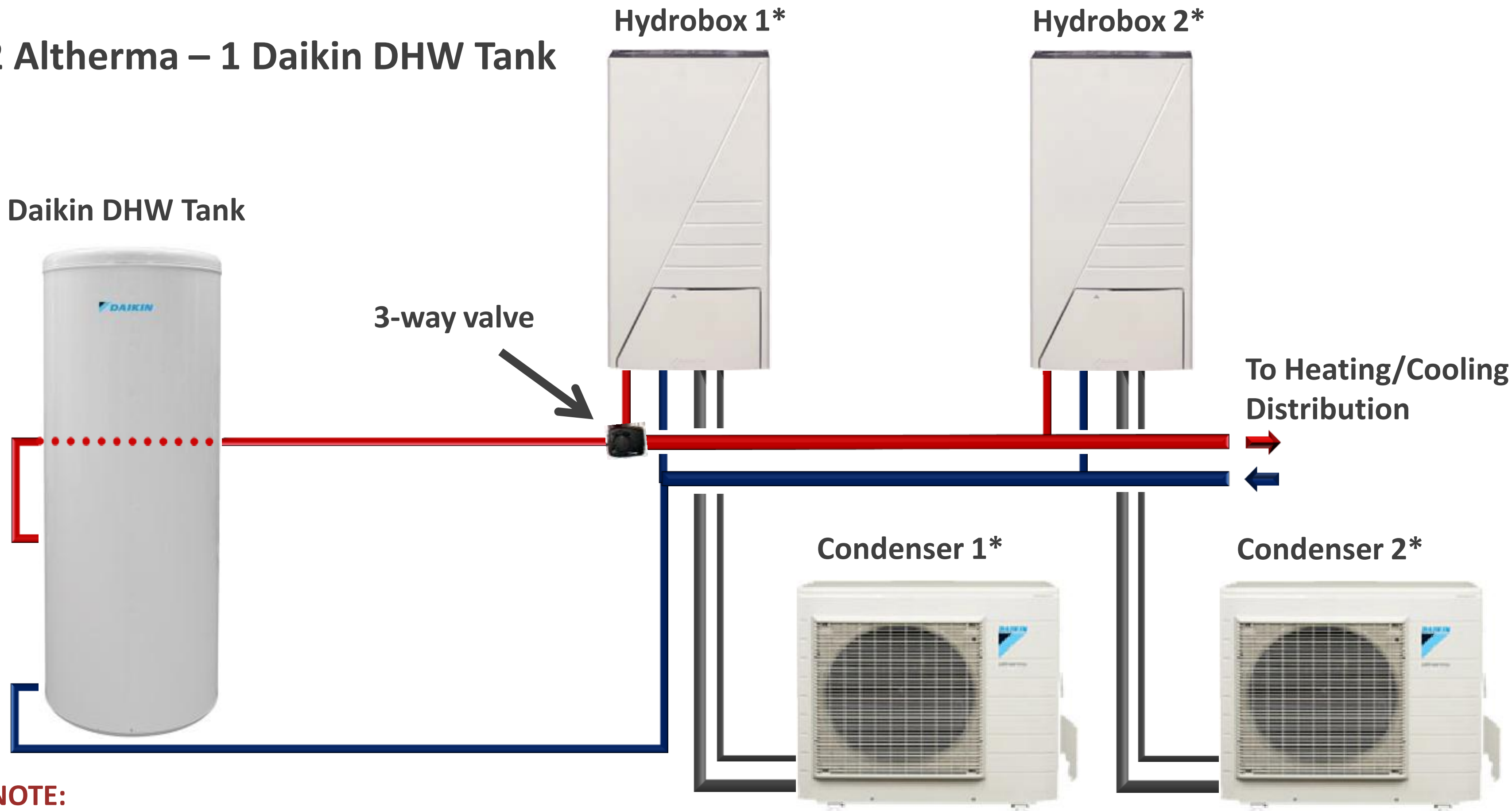
Step Six - System Layout & Design (cont.) - DHW Heat Exchanger Only (cont.)

2 Altherma – 1 Daikin DHW Tank



NOTE:
- Only one Altherma can connect to one Daikin DHW tank.

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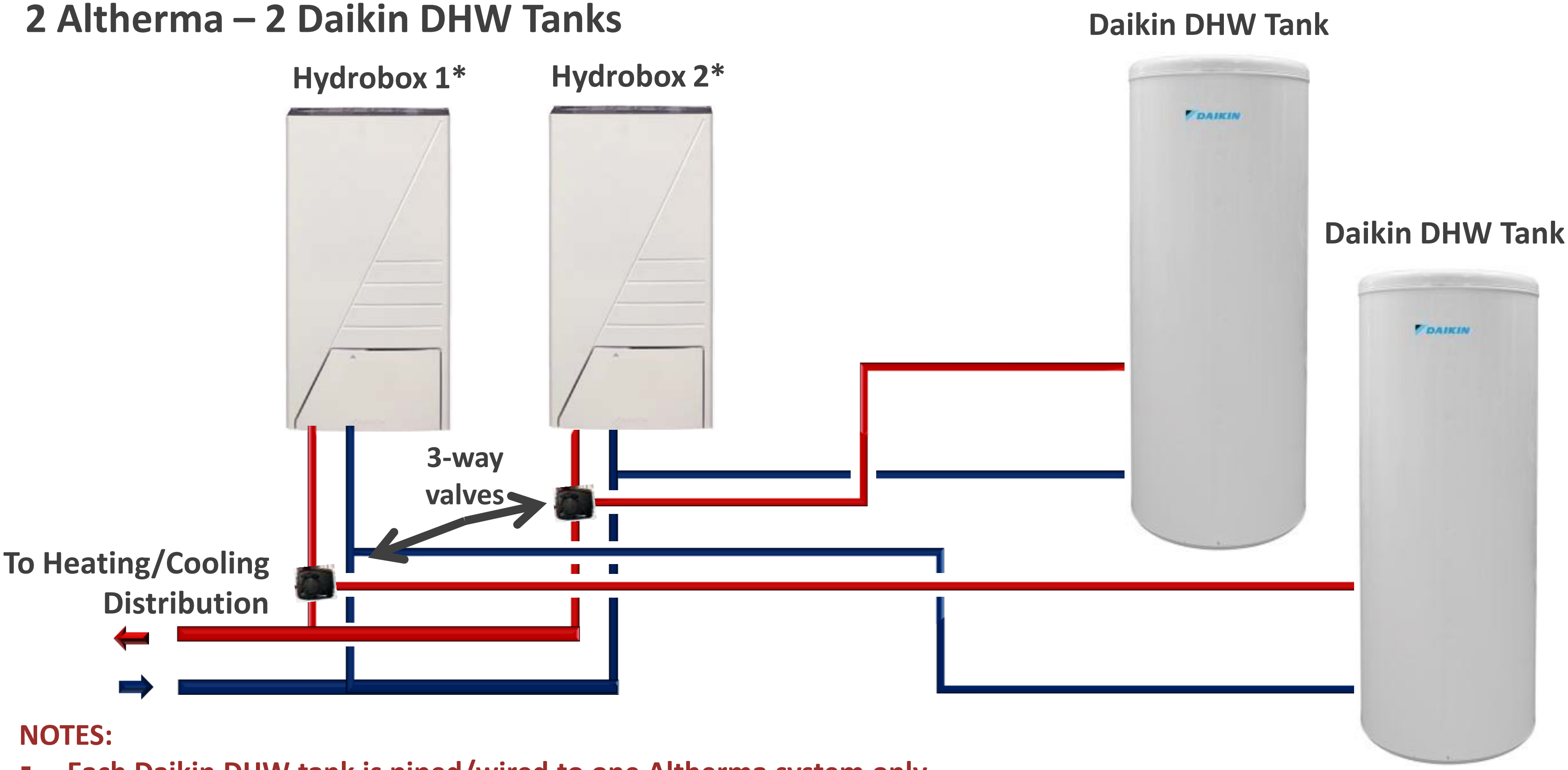
Step Six - System Layout & Design (cont.) - DHW Heat Exchanger Only (cont.)

2 Altherma – 2 Daikin DHW Tanks



NOTES:

- Each Daikin DHW tank is piped/wired to one Altherma system only.
- Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc. Relief valve, BSP/NPT adapters & isolation valves not shown.

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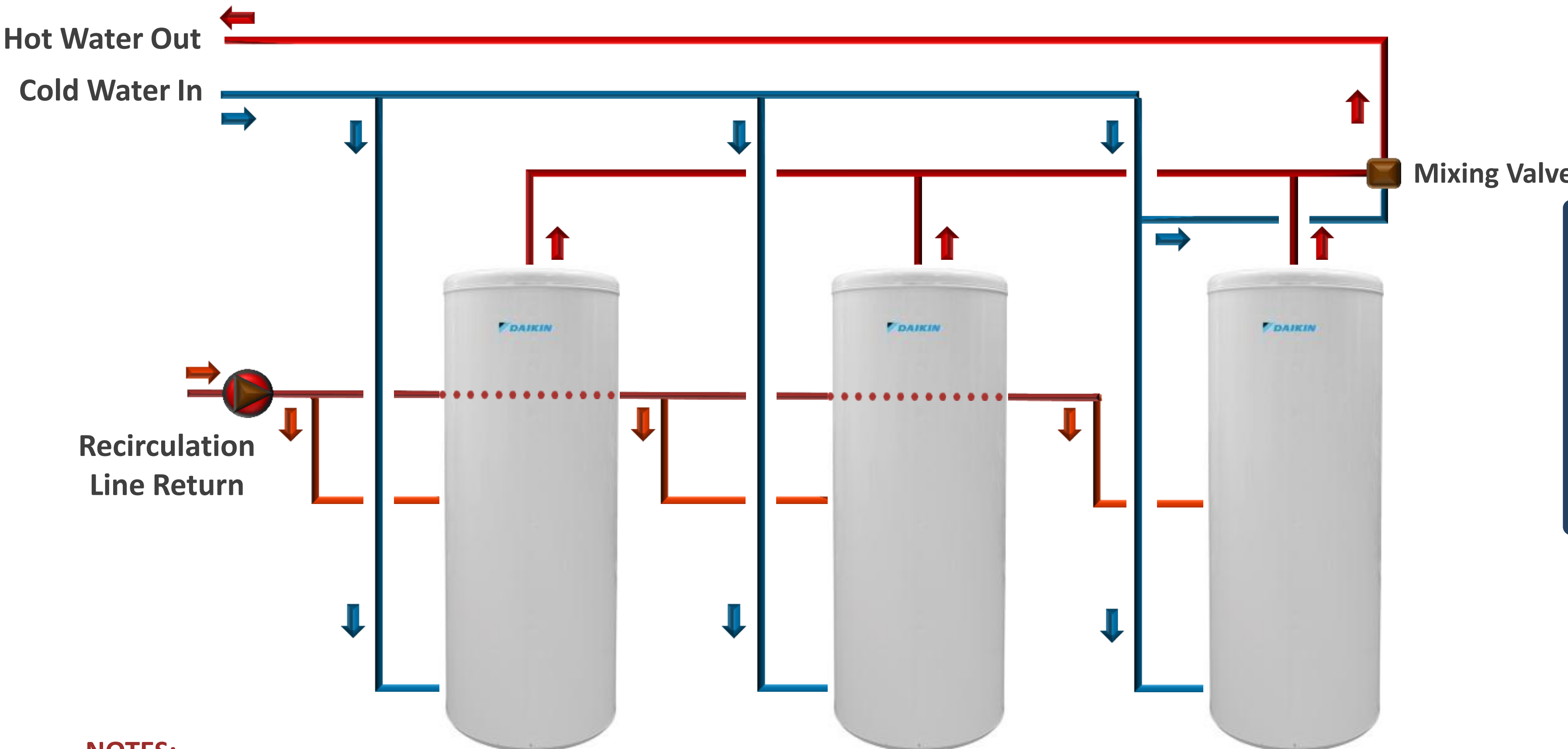
Step Six - System Layout & Design (cont.) - Domestic Piping Only



NOTES:

- Each Daikin DHW tank is piped and wired to one Altherma system only.
- Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc. Relief valve, BSP/NPT adapters & isolation valves not shown.

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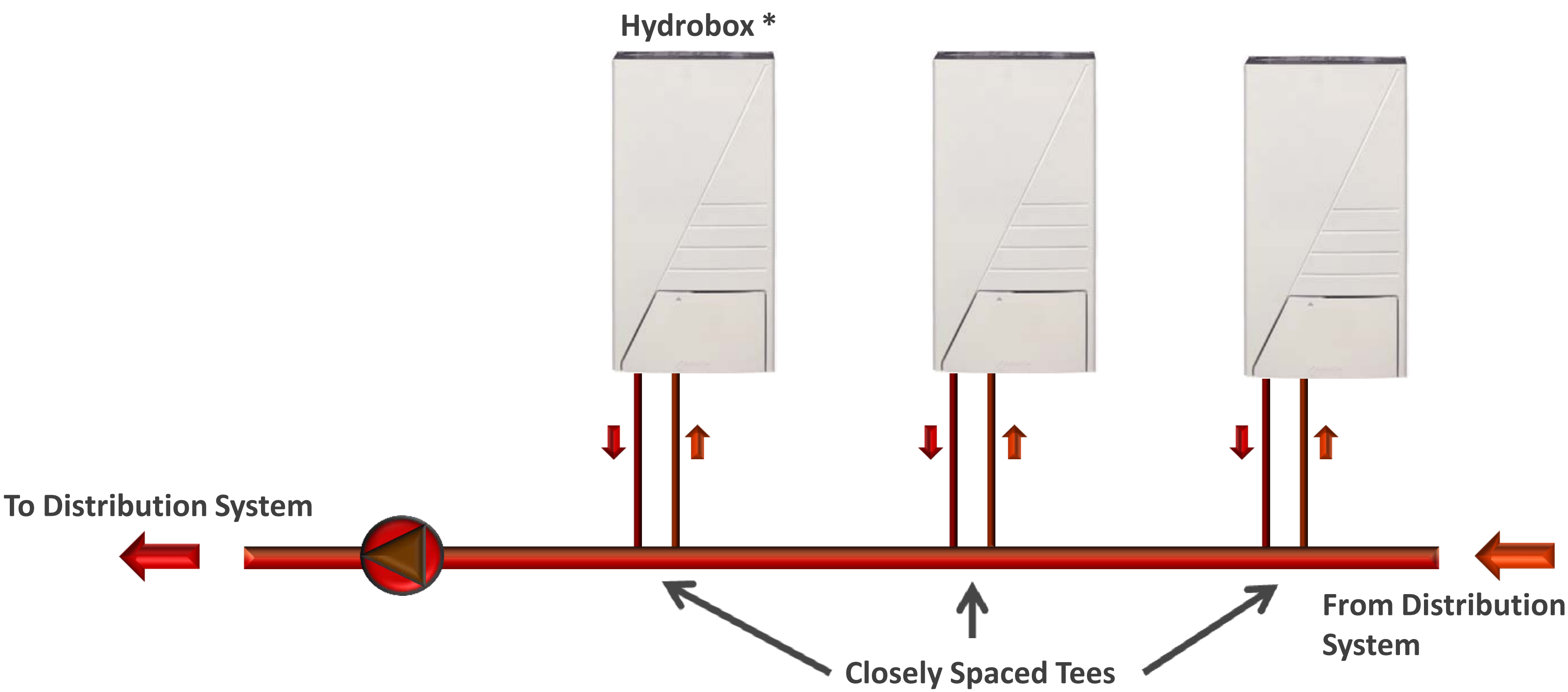
Series Primary Secondary Arrangement



NOTE: Drawing for reference only.
* - Hydrobox can be substituted for MonoBloc.

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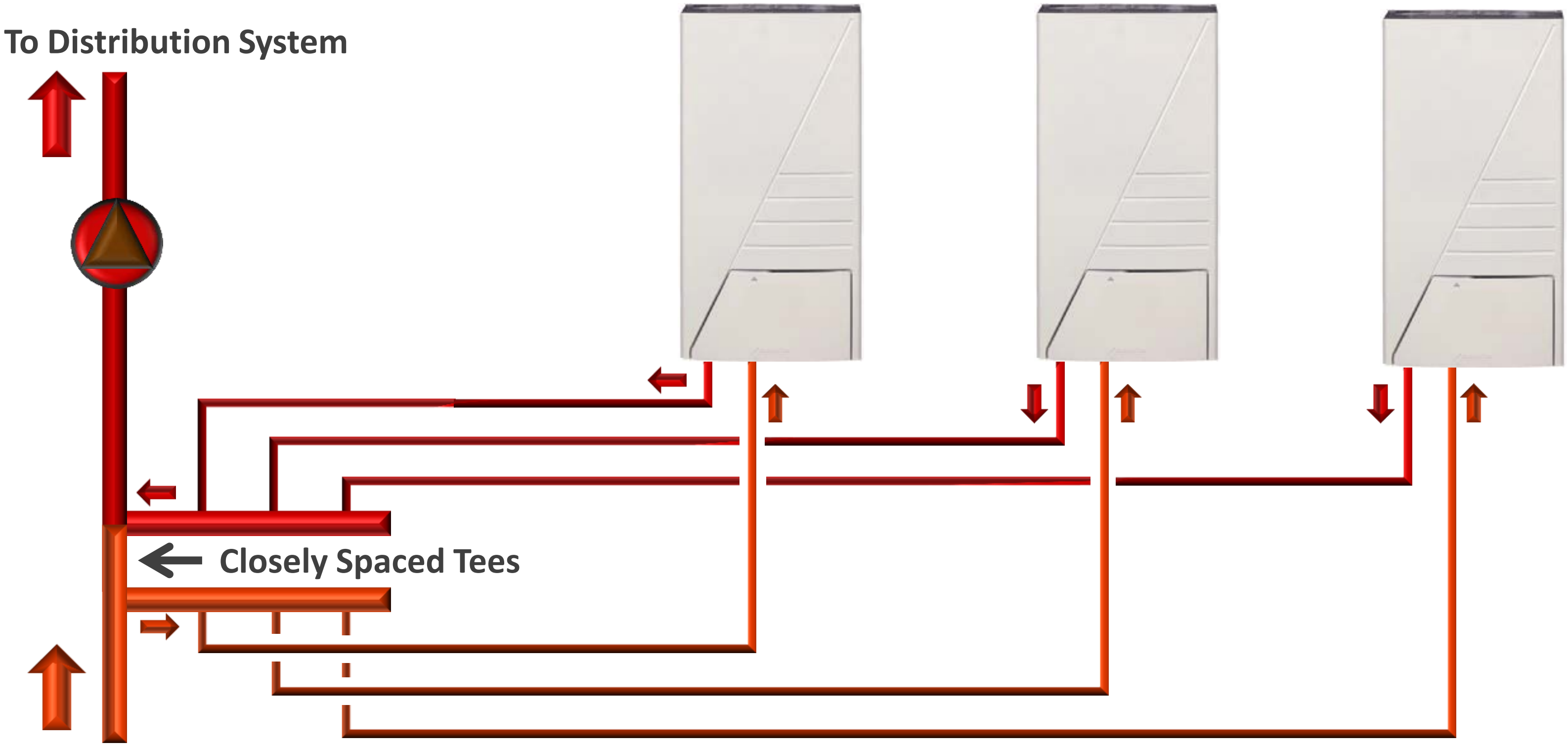
Step Six - System Layout & Design (cont.) – Manifold Piping - Multi Altherma Piping (cont.)

Parallel Primary Secondary Arrangement

Hydrobox *

To Distribution System



From Distribution System

NOTE: Drawing for reference only.
*** - Hydrobox can be substituted for MonoBloc.**

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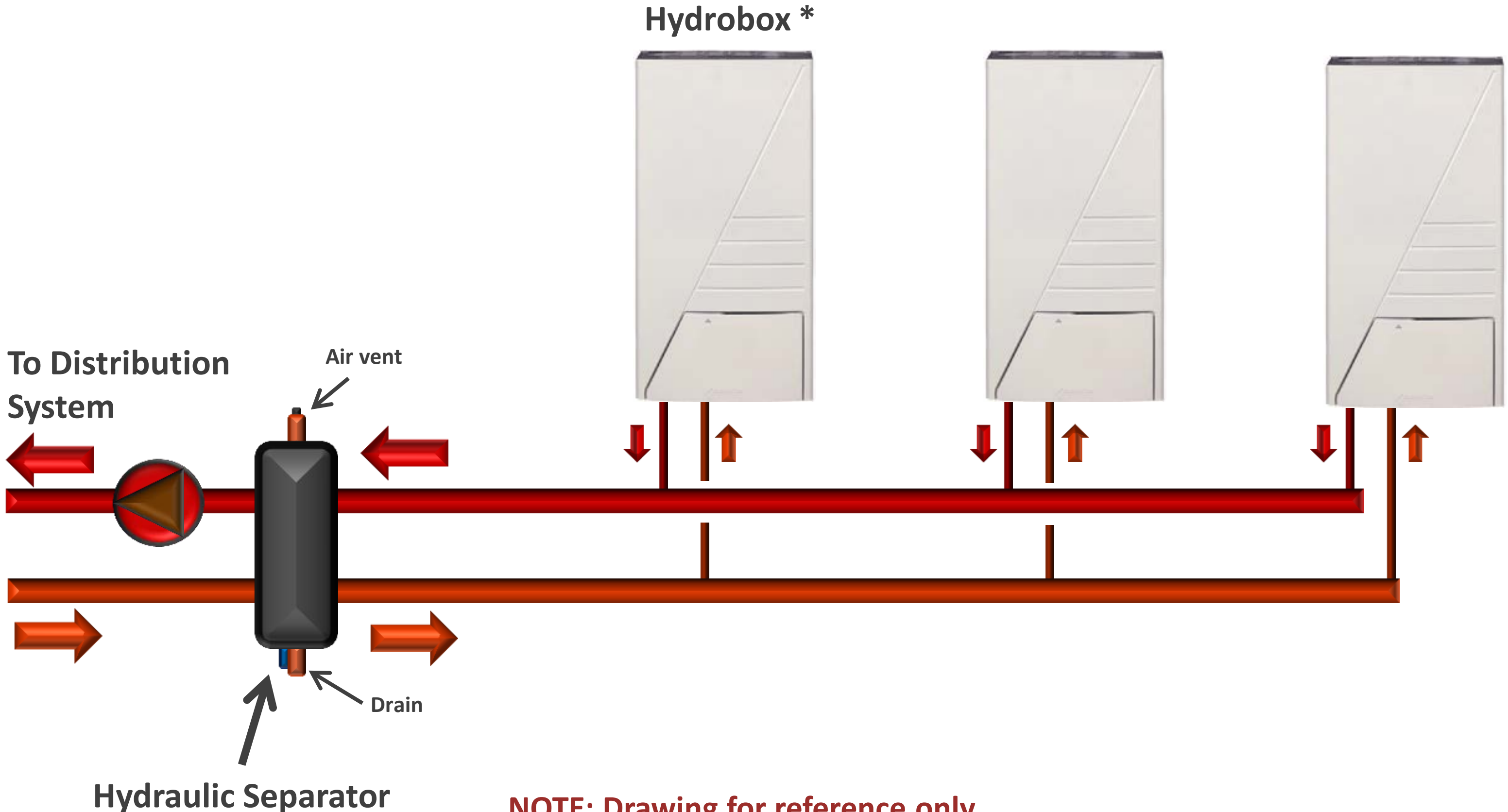
Step Six - System Layout & Design (cont.) – Manifold Piping - Multi Altherma Piping (cont.)

Hydraulic Separator Arrangement



NOTE: Drawing for reference only.
* - Hydrobox can be substituted for MonoBloc.

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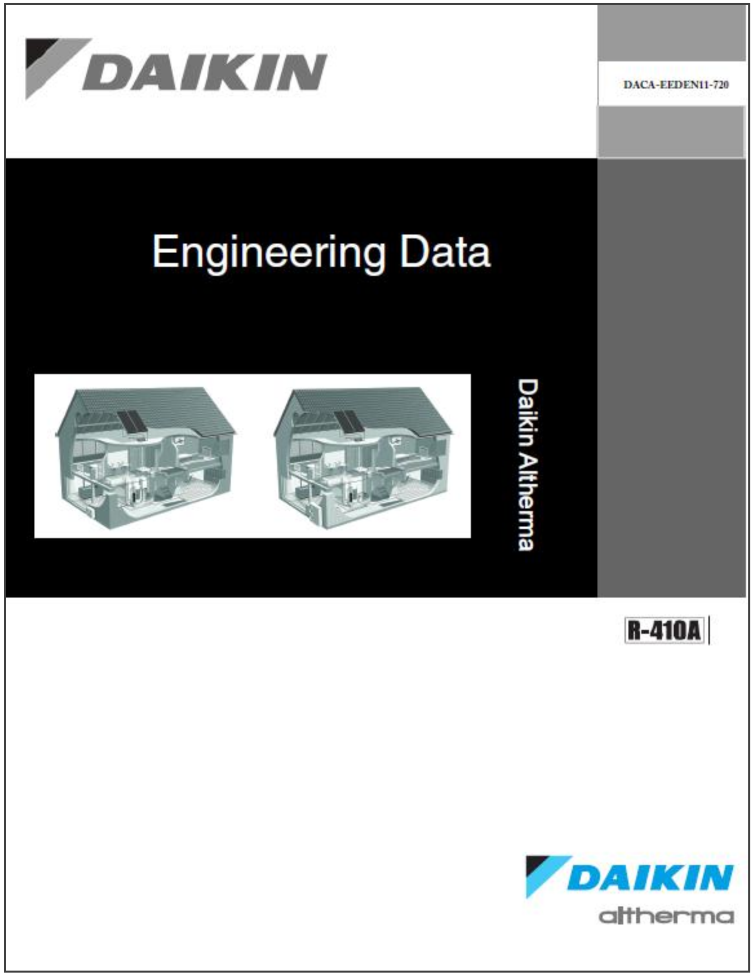
Step Six - System Layout & Design (cont.)

- Once the system and type of heating & cooling emitters are selected, it is now time to design a water distribution system that will deliver the required amount of BTU's to the fan coils, radiant floor or convectors.
- Each of these devices and the system itself has pressure drop's (PD) associated with them, these are normally measured by PSI or Feet of Head.
- It is important that the total distribution PD not exceed the Altherma's internal pump. If it does exceed the internal pump a different piping method or need for an additional pump should be considered.
- Electrical requirements should be checked depending on system configuration, size of internal Backup Heater, Water Tank, Condenser size, etc:.
- The Altherma Engineering Manual has all needed specifications to help you though the design process.



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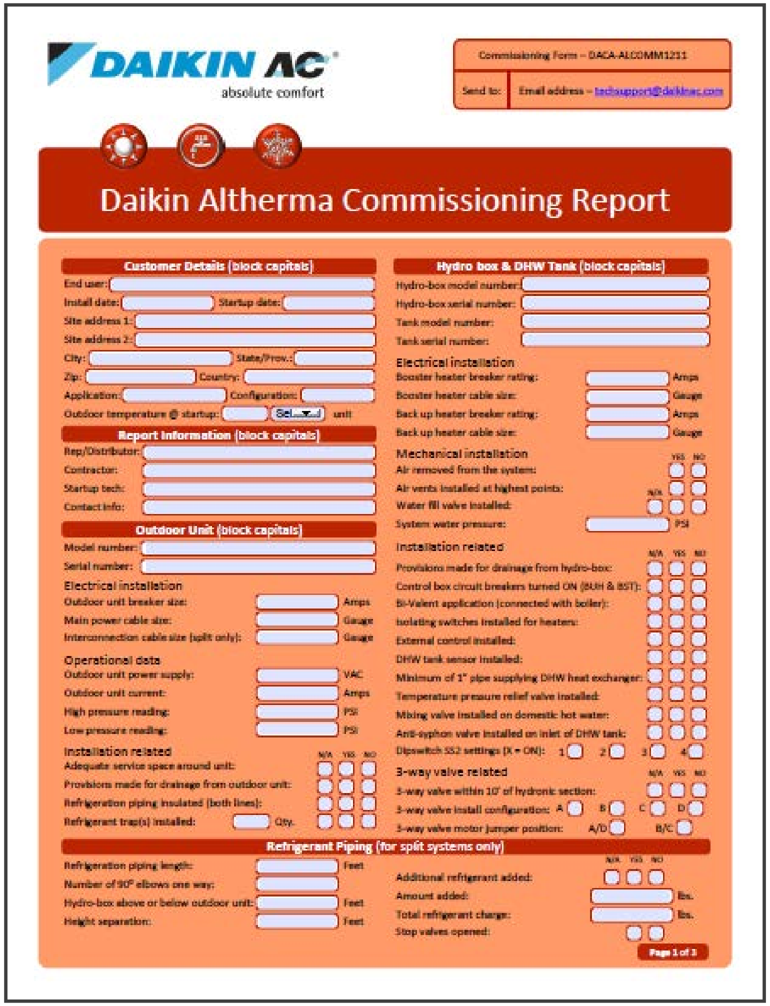
Step Seven - Installation & Commissioning

- Using Industry Best Practices is the key for a successful installation.
- This is not a boiler, don't be afraid to open and read the manuals.
- Each piece of equipment has an Installation and Operation manual.
- Spend some time before the job starts to plan out your install, jumping in without a plan could add more time and cost more money.
- After installation is complete, use the Altherma Commissioning Report to help you check and record important startup information.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Commissioning Form – DACA-ALCOMM1211

Send to: Email address – techsupport@daikinac.com

Daikin Altherma Commissioning Report

Customer Details (block capitals)

End user:
Install date: Startup date:
Site address 1:
Site address 2:
City: State/Prov.:
Zip: Country:
Application: Configuration:
Outdoor temperature @ startup: Sel... unit

Report Information (block capitals)

Rep/Distributor:
Contractor:
Startup tech:
Contact info:

Outdoor Unit (block capitals)

Model number:
Serial number:

Electrical installation
Outdoor unit breaker size: Amps
Main power cable size: Gauge
Interconnection cable size (split only): Gauge

Operational data
Outdoor unit power supply: VAC
Outdoor unit current: Amps
High pressure reading: PSI
Low pressure reading: PSI

Installation related (N/A YES NO)
Adequate service space around unit:
Provisions made for drainage from outdoor unit:
Refrigeration piping insulated (both lines):
Refrigerant trap(s) installed: Qty.

Hydro box & DHW Tank (block capitals)

Hydro-box model number:
Hydro-box serial number:
Tank model number:
Tank serial number:

Electrical installation
Booster heater breaker rating: Amps
Booster heater cable size: Gauge
Back up heater breaker rating: Amps
Back up heater cable size: Gauge

Mechanical installation (YES NO)
Air removed from the system:
Air vents installed at highest points: N/A
Water fill valve installed:
System water pressure: PSI

Installation related (N/A YES NO)
Provisions made for drainage from hydro-box:
Control box circuit breakers turned ON (BUH & BST):
Bi-Valent application (connected with boiler):
Isolating switches installed for heaters:
External control installed:
DHW tank sensor installed:
Minimum of 1" pipe supplying DHW heat exchanger:
Temperature pressure relief valve installed:
Mixing valve installed on domestic hot water:
Anti-syphon valve installed on inlet of DHW tank:
Dipswitch SS2 settings (X = ON): 1 2 3 4

3-way valve related (N/A YES NO)
3-way valve within 10' of hydronic section:
3-way valve install configuration: A B C D
3-way valve motor jumper position: A/D B/C

Refrigerant Piping (for split systems only)

Refrigeration piping length: Feet
Number of 90° elbows one way:
Hydro-box above or below outdoor unit: Feet
Height separation: Feet

Additional refrigerant added: (N/A YES NO)
Amount added: lbs.
Total refrigerant charge: lbs.
Stop valves opened:

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For more detailed information check Daikin's Engineering, Installation, Operation and Service manuals.

Available at www.daikinac.com

Thank You

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Split Installation

Installation Topics

- Daikin Altherma Main & Optional Component Model Numbers
- Equipment Specifications
- Required BSP/NPT Kits
- Internal Component Layout
- Unpacking and Mounting Hydrobox
- Service & Clearance Space
- Condenser Connections
- Cold Climate Considerations
- Refrigerant Piping Installation
- Attention Points on the Water Circuit
- Installation of 2-way Valve for Cooling Installations
- Field & Low Voltage Wiring

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Altherma Main Component Model Numbers

- **Outdoor unit**
  - ERLQ018BAVJU
  - ERLQ024BAVJU
  - ERLQ030BAVJU
  - ERLQ036BAVJU
  - ERLQ048BAVJU
  - ERLQ054BAVJU

- **Hydrobox**

  Heating Only
  - EKHBH030BA3VJU
  - EKHBH030BA6VJU
  - EKHBH054BA3VJU
  - EKHBH054BA6VJU

  Heating/Cooling
  - EKHBX030BA3VJU
  - EKHBX030BA6VJU
  - EKHBX054BA3VJU
  - EKHBX054BA6VJU

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Optional Component Model Numbers

- **Condensate Kit**
  - **EKHBDP – Needed for Cooling applications**
- **Digital I/O PCB Kit**
  - **EKRP1HBAAU**
    - **Can be used for Bi-valent & Co-valent applications**
    - **Thermal ON/OFF signal**
    - **Alarm output**
- **BSP to NPT Adapters**
  - **DACA-HBA-1 (1¼” Female BSP x 1¼” Male NPT) (for 054 hydrobox)**
  - **DACA-HBA-2 (1” Female BSP x 1” Male NPT) (for 030 hydrobox)**
- **Wall Mounting Bracket for Condenser**
  - **DACA-WB-3 (up to 500lbs.)**
- **Thermostat**
  - **EKRTW**

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Altherma Small Split Specifications

		ERLQ018BAVJU	ERLQ024BAVJU	ERLQ030BAVJU
Refrigerant	Type	R-410A		
	Charge	3.7 lb. / 1.7 kg		
Dimensions	Height	28 7/8 inch / 734 mm		
	Width	32 1/2 inch / 825 mm		
	Depth	11 7/8 inch / 302 mm		
Weight		123 lb. / 59 kg		
Compressor Type		Hermetically Sealed Swing Compressor		
Compressor Model		2YC63BXD#C		
Oil type		FVC50K		

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Altherma Small Split Specifications (cont.)

		ERLQ018BAVJU	ERLQ024BAVJU	ERLQ030BAVJU
Power Supply		1 ~ 208/230 VAC / 60Hz / 20 Amp Breaker		
Communication Protocol		“RA Communication (4 wire)”		
Operation Sound [dBA] Heat		61	61	62
Operation Sound [dBA] Cool		63	63	63
Low Noise Heat		--	--	--
Low Noise Cool		--	--	--
Operation Range Air side	Cooling	109 ~ 50°FWB / 43 ~ 10°CWB		
	Heating	77 ~ 5°FDB / 25 ~ -15°CDB		
	Hot Water	95 ~ 5°FDB* / 35 ~ -15°CDB*		
Piping	Max Length	98 ft. / 30 m		
	Min Length	9.8 ft. / 3 m		
	Chargeless	33 ft. / 10 m		
	Std Gas Pipe Ø	5/8 inch / 15.9 mm		
	Std Liquid Pipe Ø	1/4 inch / 6.35 mm		

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* Booster heating operation from 95ºF/35ºC

Altherma Small Split Specifications (cont.)

		EKHBH030BA	EKHBX030BA
		Heating Only	Heat/Cool
			
Refrigerant	Type	R410A	
Dimensions (Unit)	Height	36 5/16 inch / 922 mm	
	Width	19 3/4 inch / 502 mm	
	Depth	14 7/32 inch / 361 mm	
Weight	Empty Unit	101 lb. / 46 kg	
	In Operation	130 lb. / 59 kg	
Power Supply Unit		Via outdoor unit: 1 ~ 208/230 VAC / 60Hz	

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Altherma Small Split Specifications (cont.)

		EKHBH030BA	EKHBX030BA
		Heating Only	Heat/Cool
Power Supply Backup Heater	3VJU	1 ~ 208/230 VAC / 60Hz - 3kW / 20 Amp Breaker	
	6VJU	1 ~ 208/230 VAC / 60Hz - 6kW / 30 Amp Breaker	
Sound pressure level [dBA]		29dBA	29dBA
Operation Range	Cooling water side		41 ~ 71.6°F (5 ~ 22°C)
	Heating water side	15 ~ 50°C (15 ~ 25°C BUH only) 59 ~ 122°F (59 ~ 77°F BUH only)	
Piping Water	Water In/Outlet	1” Male BSPP	
Internal Water Volume		1.45 gal / 5.5 l	
Pressure Relief Valve Water Circuit		43.5 PSI / 3 bar	
Piping Refrigerant	Std Liquid Pipe Ø	1/4 inch / 6.35 mm	
	Std Gas Pipe Ø	5/8 inch / 15.9 mm	

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Altherma Small Split Specifications (cont.)

Altherma Split System Combination		ERLQ018BAVJU EKHBH(X)030BA	ERLQ024BAVJU EKHBH(X)030BA	ERLQ030BAVJU EKHBH(X)030BA
Pump	Type	Water Cooled, Internal		
	# of Speeds	3		
Minimum Water Flow		3.17 GPM		
Maximum Water Flow		N/A		

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Altherma Small Split Specifications (cont.)

Altherma	Mode	Unit	EKHBH030 ERLQ 018	EKHBH030 ERLQ 024	EKHBH030 ERLQ 030	EKHBX030 ERLQ 018	EKHBX030 ERLQ 024	EKHBX030 ERLQ 030
Nominal ESP unit	Cooling	Ft. of Hd.	- - -	- - -	- - -	17.1	15.8	15.4
		PSI				7.4	6.85	6.67
	Heating	Ft. of Hd.	16.0	13.8	10.2	16.0	13.8	10.2
		PSI	6.93	5.99	4.42	6.93	5.99	4.42
Water flow rate at Nominal ESP	Cooling (1)	GPM	- - -	- - -	- - -	3.88	4.44	6.40
		l/m				28.7	16.8	17.4
	Heating (2)	GPM	4.36	5.18	6.37	4.36	5.18	6.37
		l/m	16.5	19.6	24.1	16.5	19.6	24.1
Minimum flow	all	GPM	3.17					
		l/m	12.0					
Maximum flow		GPM l/m	- - -					

1. Outside Temp 95°F (35°C) – Leaving water evaporator temp 44.6°F (7°C) (DT = 9°F (5°C)
2. Outside Temp DB/WB 44.6°F/42.8°F (7°C/6°C) – Leaving water condenser temp 95°F (35°C) (DTΔ = 9°F (5°C)

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Altherma Large Split Specifications

<table>
<tr><th colspan="2"></th><th>ERLQ036BAVJU</th><th>ERLQ048BAVJU</th><th>ERLQ054BAVJU</th></tr>
<tr><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td rowspan="2">Refrigerant</td><td>Type</td><td colspan="3">R-410A</td></tr>
<tr><td>Charge</td><td colspan="3">8.2 lb. / 3.7 kg</td></tr>
<tr><td rowspan="3">Dimensions</td><td>Height</td><td colspan="3">46 1/16 inch / 1170 mm</td></tr>
<tr><td>Width</td><td colspan="3">35 7/16 inch / 900 mm</td></tr>
<tr><td>Depth</td><td colspan="3">12 5/8 inch / 320 mm</td></tr>
<tr><td colspan="2">Weight</td><td colspan="3">227.07 lb. / 103 kg</td></tr>
<tr><td colspan="2">Compressor Type</td><td colspan="3">Hermetically Sealed Scroll Compressor</td></tr>
<tr><td colspan="2">Compressor Model</td><td colspan="3">JT100G-VD</td></tr>
<tr><td colspan="2">Oil Type</td><td colspan="3">Daphne FVC68D</td></tr>
</table>

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Altherma Large Split Specifications (cont.)

		ERLQ036BAVJU	ERLQ048BAVJU	ERLQ054BAVJU
Power Supply		1 ~ 208/230 VAC / 60Hz / 30 Amp Breaker		
Communication Protocol		"RA Communication (4 wire)"		
Operation Sound [dBA] Heat		49	51	53
Operation Sound [dBA] Cool		50	52	54
Low Noise Heat		42	42	43
Low Noise Cool		45	45	48
Operation Range Air side	Cooling	114 ~ 50°FWB / 46 ~ 10°CWB		
	Heating	95 ~ -4°FDB / 35 ~ -20°CDB		
	Hot Water	95 ~ -4°FDB* / 35 ~ -20°CDB*		
Piping	Max Length	246 ft. / 75 m		
	Min Length	16.4 (9.84) ft.** / 5 (3) m**		
	Chargeless	98.4 ft. / 30 m		
	Std Liquid Pipe Ø	3/8 inch / 9.52 mm		
	Std Gas Pipe Ø	5/8 inch / 15.9 mm		

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* Booster heating operation from 95ºF/35ºC

Altherma Large Split Specifications (cont.)

		EKHBH054BA	EKHBX054BA
		Heating Only	Reversible
Refrigerant	Type	R410A	
Dimensions (Unit)	Height	36 5/16 inch / 922 mm	
	Width	19 3/4 inch / 502 mm	
	Depth	14 7/32 inch / 361 mm	
Weight	Empty Unit	123 lb. / 55 kg	
	In Operation	152 lb. / 69 kg	
Power Supply Unit		Via Outdoor Unit: 1 ~ 208/230 VAC / 60Hz	

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Altherma Large Split Specifications (cont.)

		EKHBH054BA	EKHBX054BA
Power Supply Backup Heater	3VJU	1 ~ 208/230 VAC / 60Hz - 3kW / 20 Amp Breaker	
	6VJU	1 ~ 208/230 VAC / 60Hz - 6kW / 30 Amp Breaker	
Sound Pressure Level [dBA]		28dBA	28dBA
Operation Range	Cooling water side		41 ~ 71.6°F / 5 ~ 22°C
	Heating water side	15 ~ 55°C (15 ~ 25°C BUH only) 59 ~ 131°F (59 ~ 77°F BUH only)	
Piping Water	Water In/Outlet	1 - 1/4” Male BSPT	
Internal Water Volume		1.45 gal / 5.5 l	
Pressure Relief Valve Water Circuit		43.5 PSI / 3 bar	
Piping Refrigerant	Std Liquid Pipe Ø	3/8 inch / 9.52 mm	
	Std Gas Pipe Ø	5/8 inch / 15.9 mm	

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Altherma Large Split Specifications (cont.)

Altherma Split System Combination		ERLQ036BAVJU EKHBH(X)054BA	ERLQ048BAVJU EKHBH(X)054BA	ERLQ054BAVJU EKHBH(X)054BA
Pump	Type	Water Cooled, Internal		
	# of Speeds	3		
Minimum Water Flow		4.23 GPM		
Maximum Water Flow		15.3 GPM		

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Altherma Large Split Specifications (cont.)

Altherma	Mode	Unit	EKHBH054 ERLQ 036	EKHBH054 ERLQ 048	EKHBH054 ERLQ 054	EKHBX054 ERLQ 036	EKHBX054 ERLQ 048	EKHBX054 ERLQ 054
Nominal ESP unit	Cooling	Ft. of Hd.	- - -	- - -	- - -	18.6	15.1	14.2
		PSI				8.04	6.53	6.13
	Heating	Ft. of Hd.	17.0	12.7	9.1	17.0	12.7	9.1
		PSI	7.34	5.48	3.92	7.34	5.48	3.92
Water flow rate at Nominal ESP	Cooling (1)	GPM	- - -	- - -	- - -	7.58	9.45	9.90
		l/m				28.7	35.8	37.5
	Heating (2)	GPM	8.47	10.59	12.12	8.47	10.59	12.12
		l/m	32.1	40.1	45.9	32.1	40.1	45.9
Minimum flow	all	GPM	4.23					
		l/m	16.0					
Maximum flow		GPM	15.32					
		l/m	58.0					

1. Outside Temp 95ºF (35ºC) – Leaving water evaporator temp 44.6ºF (7ºC) (DT = 9ºF (5ºC)
2. Outside Temp DB/WB 44.6ºF/42.8ºF (7ºC/6ºC) – Leaving water condenser temp 95ºF (35ºC) (DTΔ = 9ºF (5ºC)

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Required BSP Kits

- **BSP Kits are ordered separately from equipment.**

Model Number	Qty. Required	Description
DACA-HBA-2	1	2 fittings for hydrobox heating/cooling loop in and out 1” female NPT connections – 030 hydrobox
DACA-HBA-1	1	2 fittings for hydrobox heating/cooling loop in and out 1 ¼” female NPT connections – 054 hydrobox

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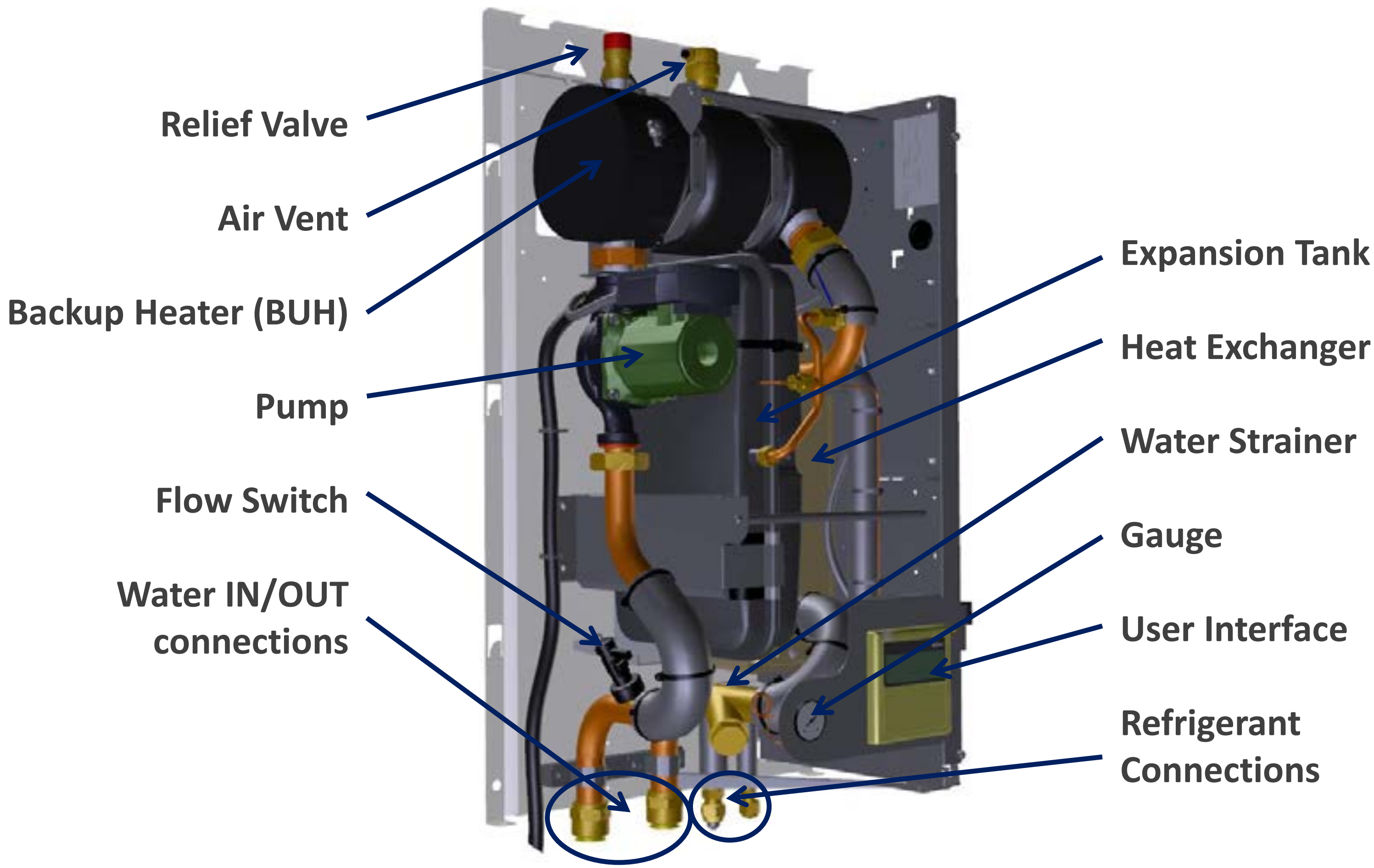
Internal Component Layout – Hydrobox



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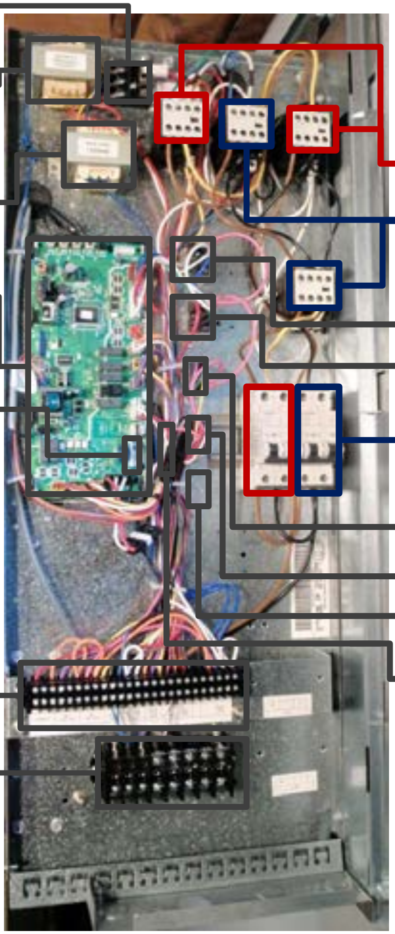
Internal Component Layout – Hydrobox (cont.)

Hydrobox Control Box



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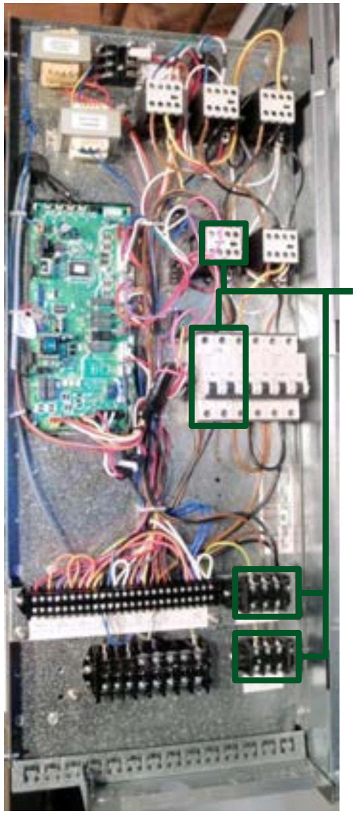
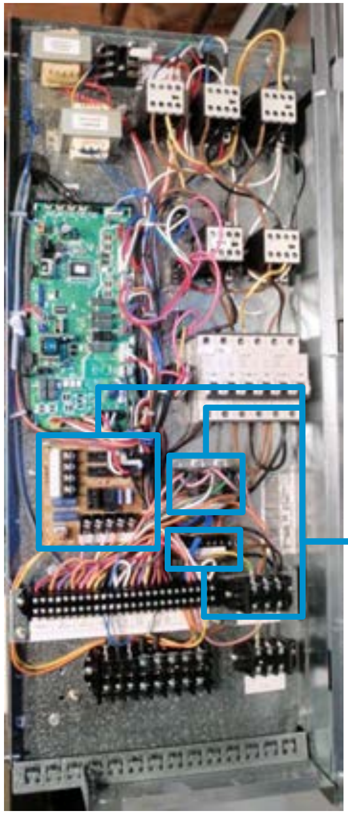
Internal Component Layout – Hydrobox (cont.)

Hydrobox with DHW Option



DHW Tank Option Relay, Breaker (F2B) & Terminal Blocks

Hydrobox with Digital IO PCB Kit



EKRP1HBAAU PCB, Relays & Terminal Block

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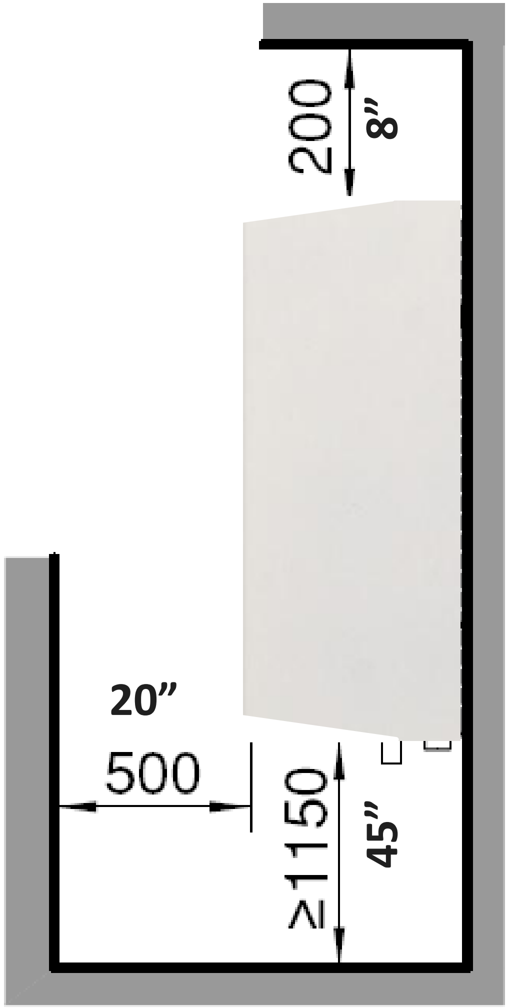
Clearance & Service Space – Hydrobox



- These are minimum recommended distances
- The control box is on the right hand side
- The installer should leave enough room for future service work
- The top of the unit is vented, do not block

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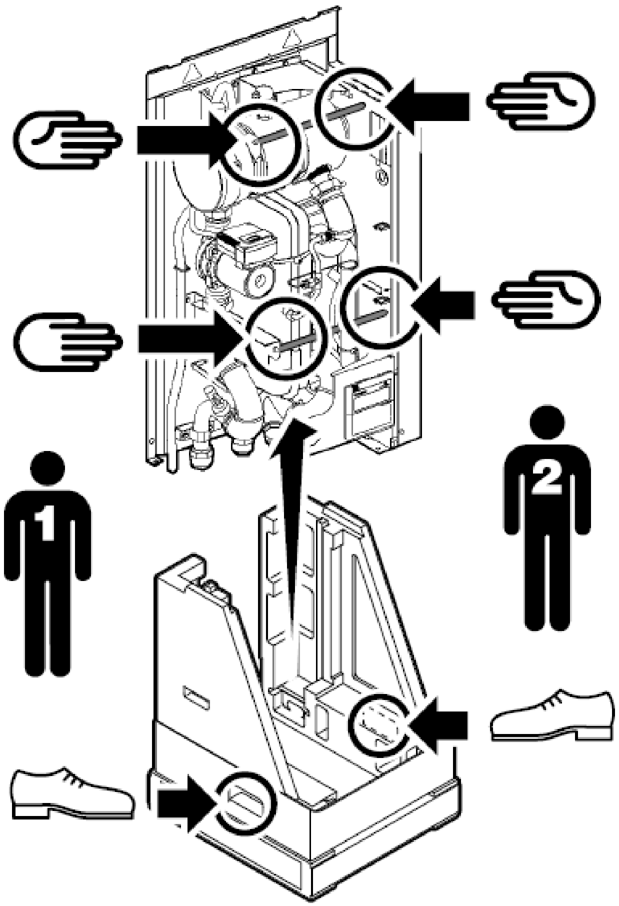
Unpacking and Mounting Hydrobox

- **Lift hydrobox up using lifting points**



CAUTION:

**The weight of the indoor unit is approximately 123 lbs./55 kg.
Two persons are required to mount the unit.**

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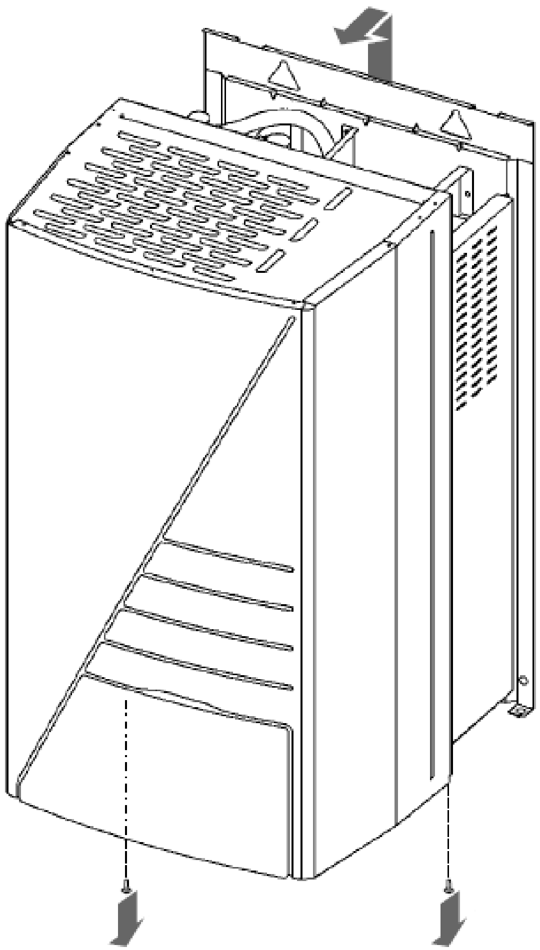
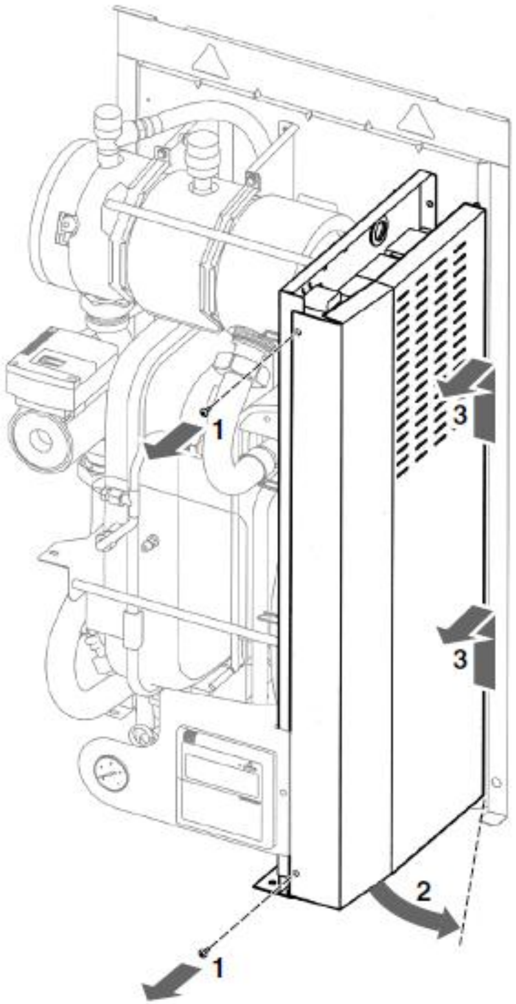
Unpacking and Mounting Hydrobox (cont.)



- Remove Hydrobox front cover
- Remove control box



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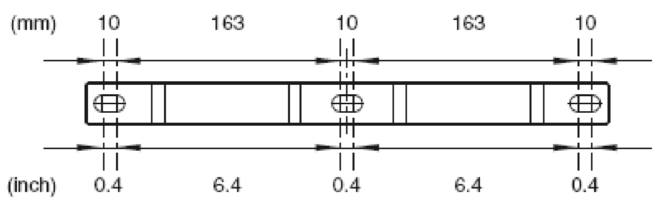
Unpacking and Mounting Hydrobox (cont.)

- 054 hydrobox hangs on factory supplied wall bracket

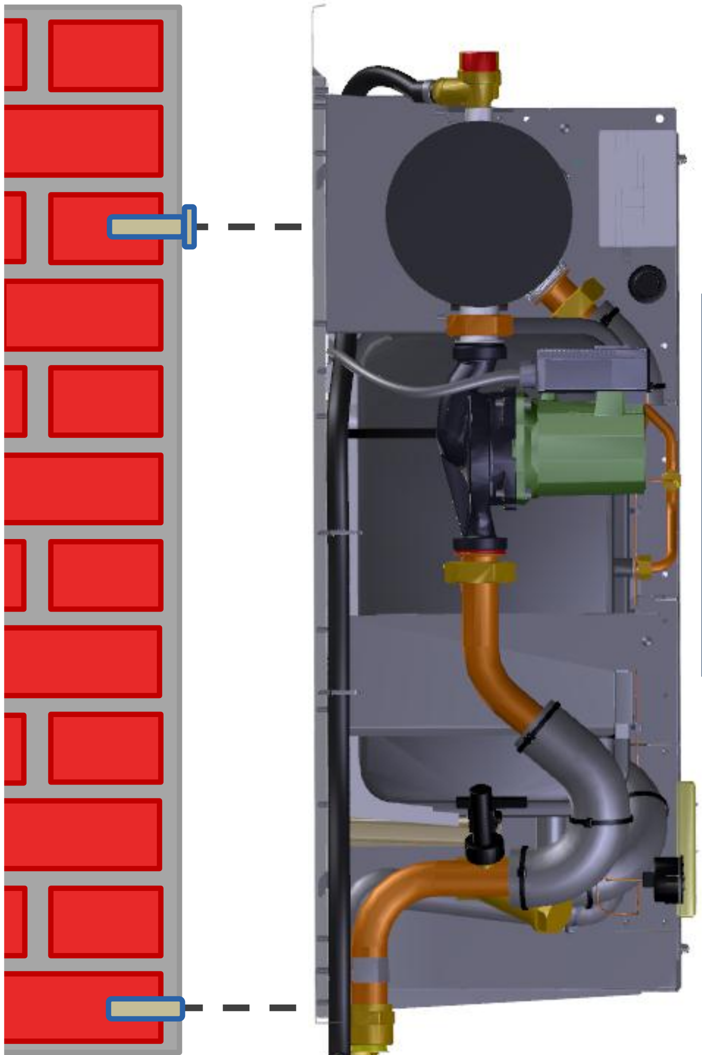
Dimensions of the wall bracket



- 030 uses pattern to locate both holes to hang hydrobox on wall

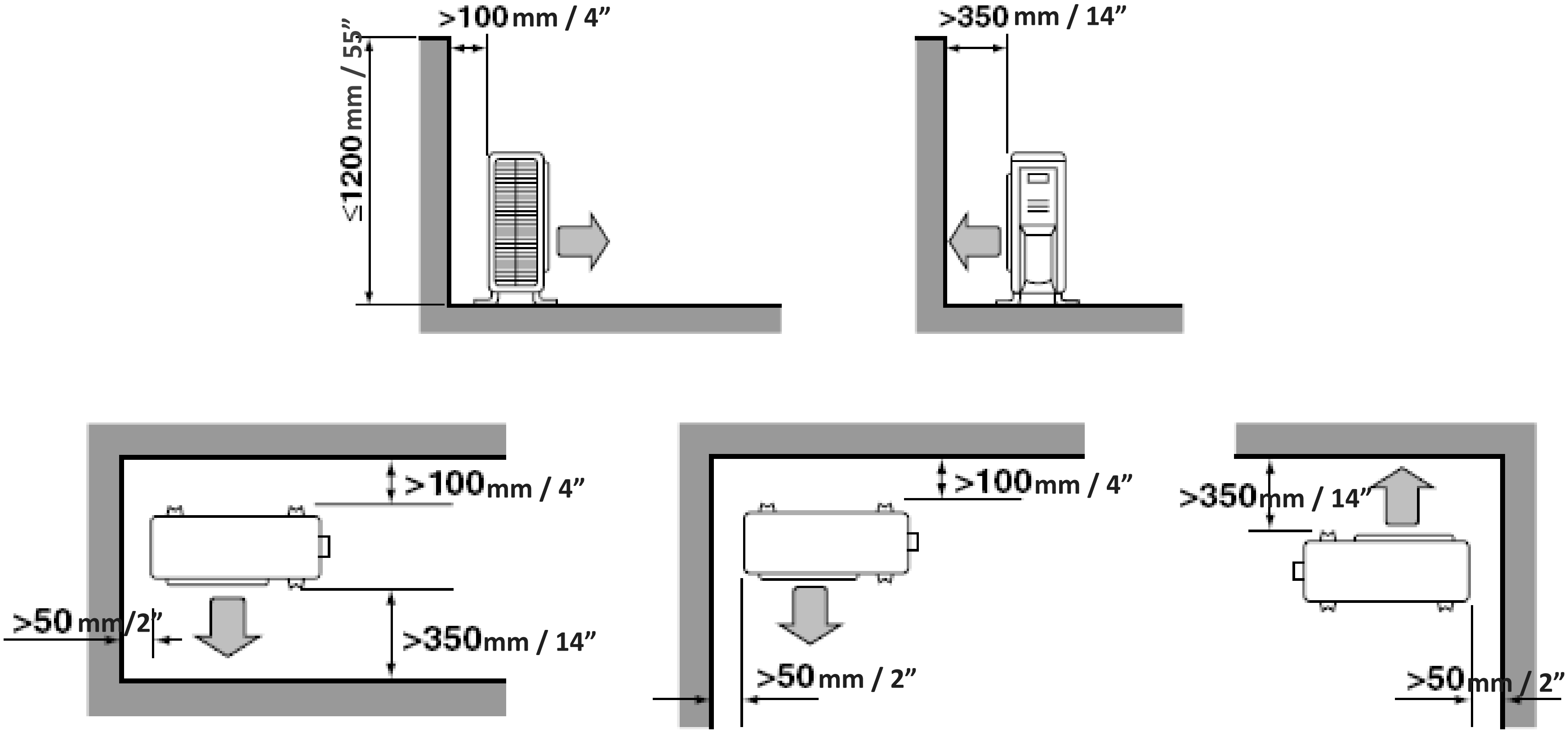
Pattern is located on side of shipping box of 030 hydrobox

- Install two bolts in lower hole on both units



Condenser Service & Clearance Space

ERLQ018/24/30BAVJU



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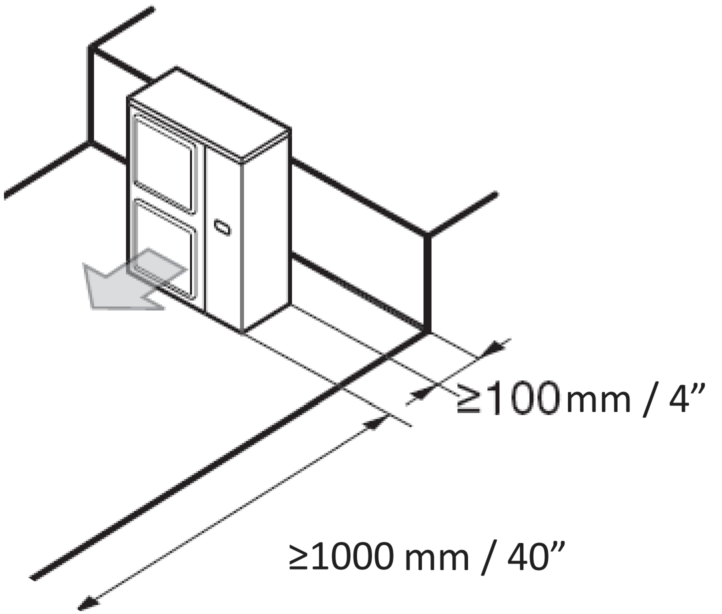
Condenser Service & Clearance Space (cont.)

ERLQ036/48/54BAVJU



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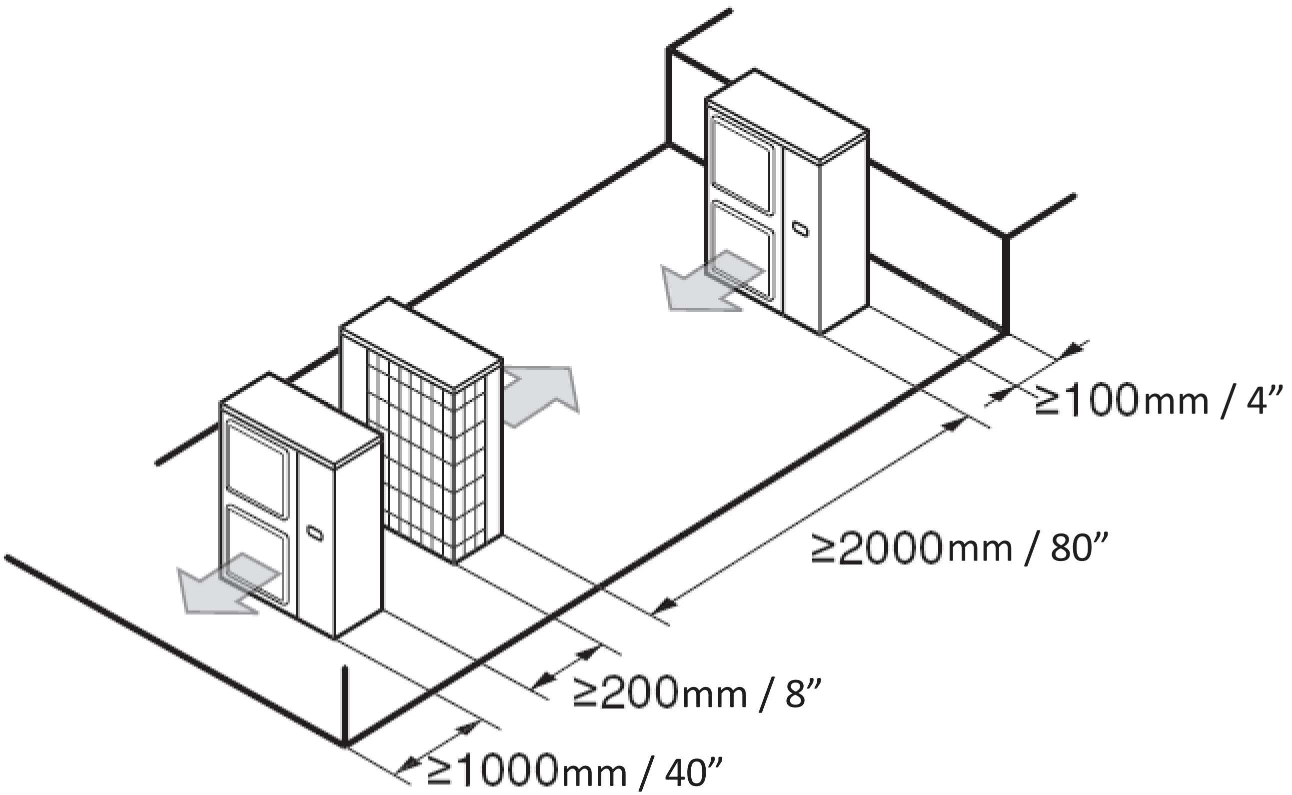
Condenser Service & Clearance Space (cont.)

ERLQ036/48/54BAVJU



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Condenser Service & Clearance Space (cont.)

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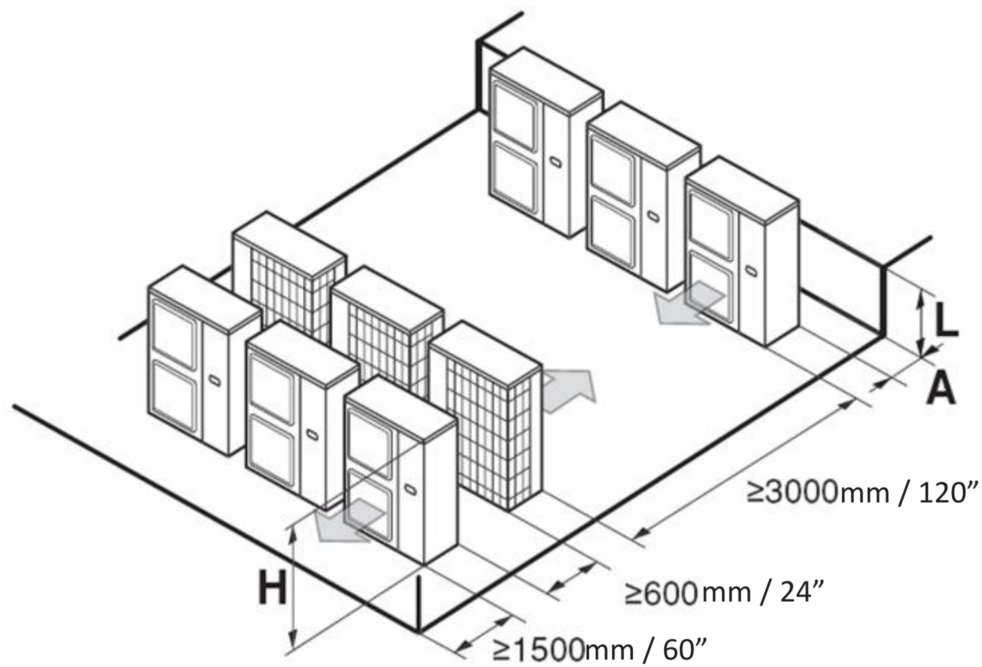
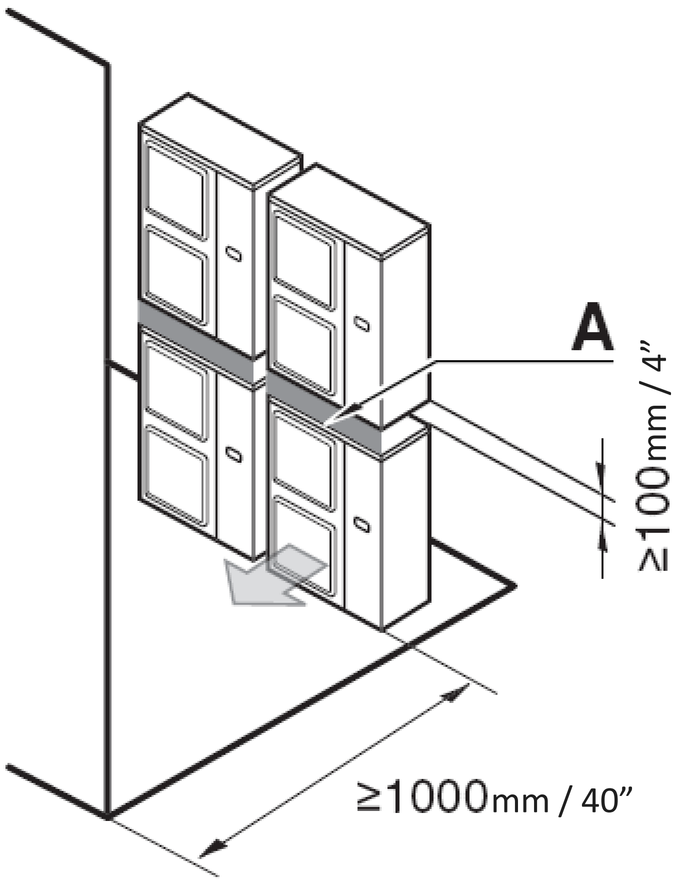
ERLQ036/48/54BAVJU



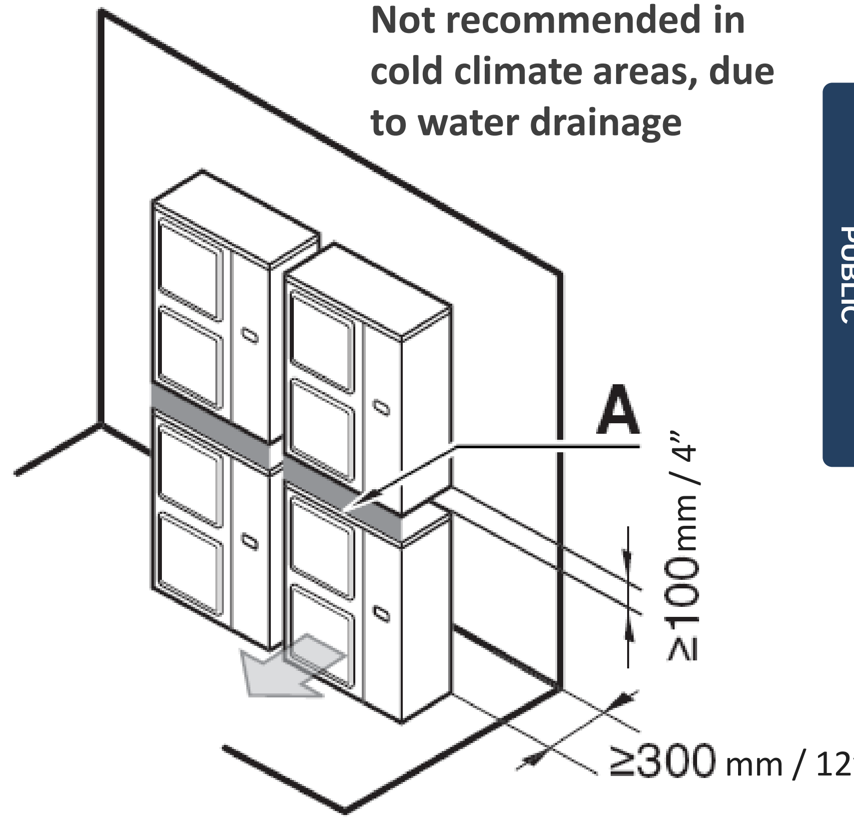
	L	A
L≤H	0<L≤1/2H	250 mm / 10”
	1/2H<L	300 mm / 12”
H<L	Installation impossible	

Condenser Service & Clearance Space (cont.)

ERLQ036/48/54BAVJU



Not recommended in cold climate areas, due to water drainage



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Condenser Connections

ERLQ018/24/30BAVJU

X1M Terminal Strip

X2M Terminal Strip

Refrigerant Connections

X1Y Connectors Base Pan Heater

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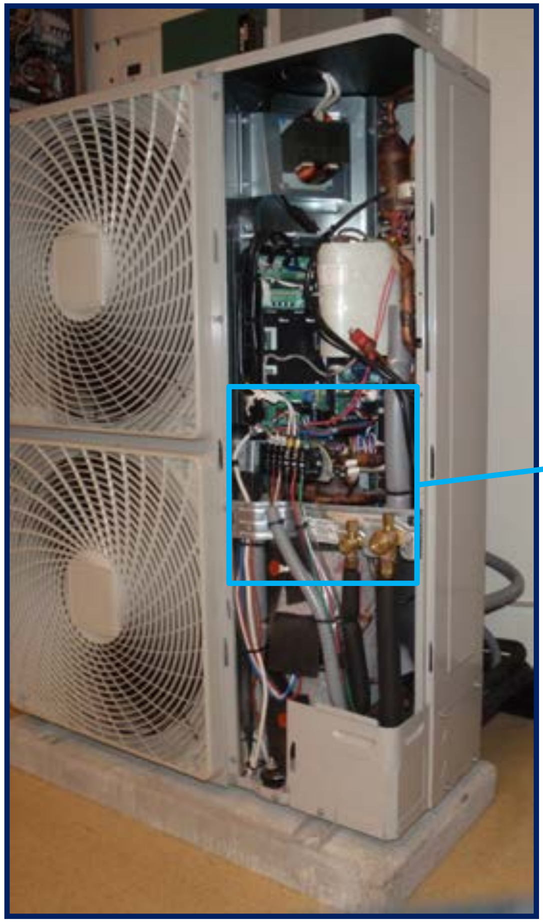
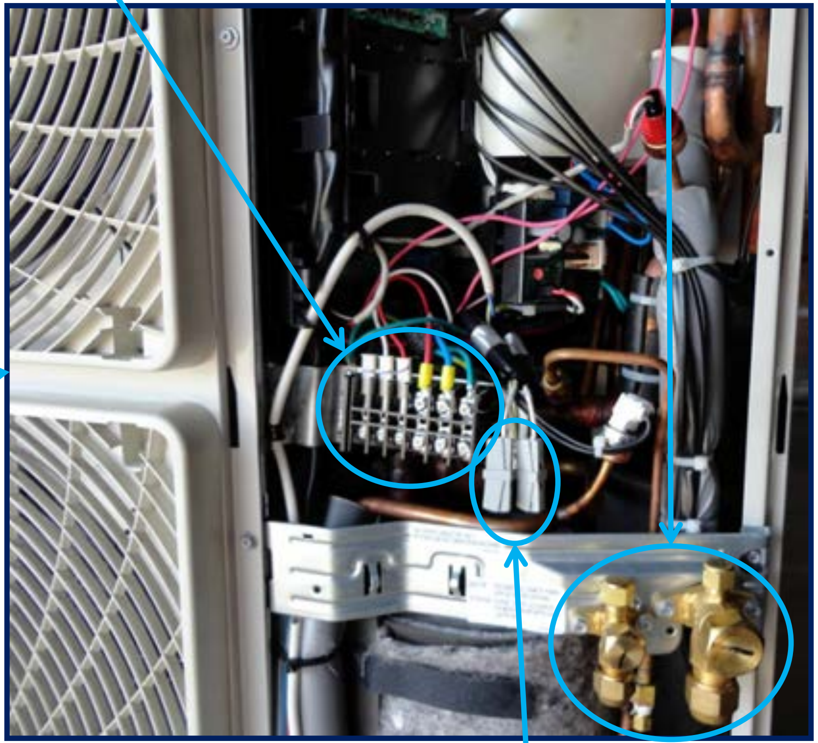
Condenser Connections (cont.)

ERLQ036/48/54BAVJU





X1M Terminal Strip

Refrigerant Connections

X1Y Connectors Base Pan Heater

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Cold Climate Considerations

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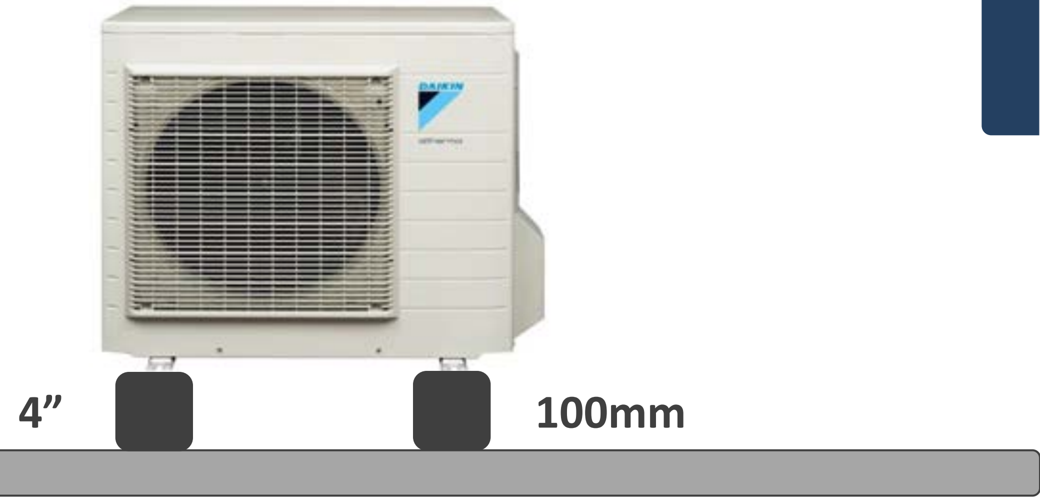
Drain (outdoor unit)

If drain holes of the outdoor unit are covered by a mounting base or by floor surface, it is recommended to raise the unit in order to provide a minimum free space of 4 inch/100 mm or more under the outdoor unit.

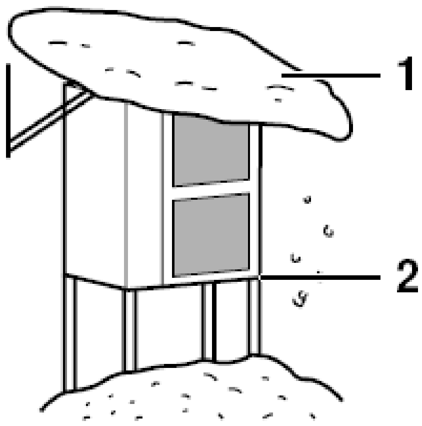
- **ERLQ018/024/030BAVJU**
  - **134 lbs.**
- **ERLQ036/048/054BAVJU**
  - **251 lbs.**



Cold Climate Considerations (cont.)

Heavy Snowfall Areas

In heavy snowfall areas it is very important to select an installation site where the snow will not affect the unit. If lateral snowfall is possible, make sure that the heat exchanger coil is not affected by the snow (if necessary construct a lateral canopy).



1 - Construct a large canopy.

2 - Construct a pedestal. Install the unit high enough off the ground to prevent burying in snow.

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Daikin Altherma Refrigerant Piping Requirements

- R-410A Developed since 1992
- Ozone friendly - No Chlorine
- Significant GWP – 2088 (R-11 4750, R-22 1810, R-134A 1430)
- Not compatible with mineral oils
- Generally non-toxic, non-flammable
- Refrigerant of choice
- Used by Daikin since 1995

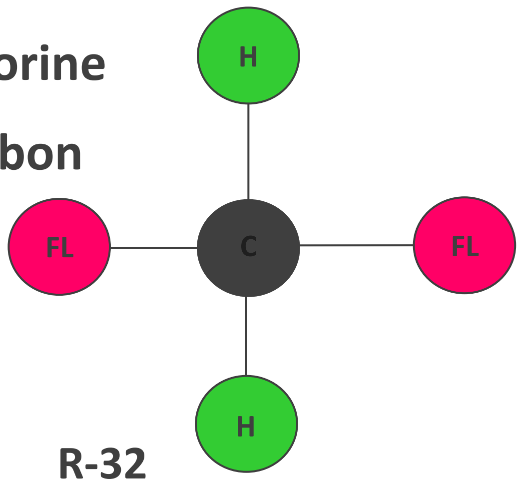
Daikin Altherma Refrigerant Piping Requirements (cont.)

HFC R-410A

H - Hydrogen

FL - Fluorine

C - Carbon

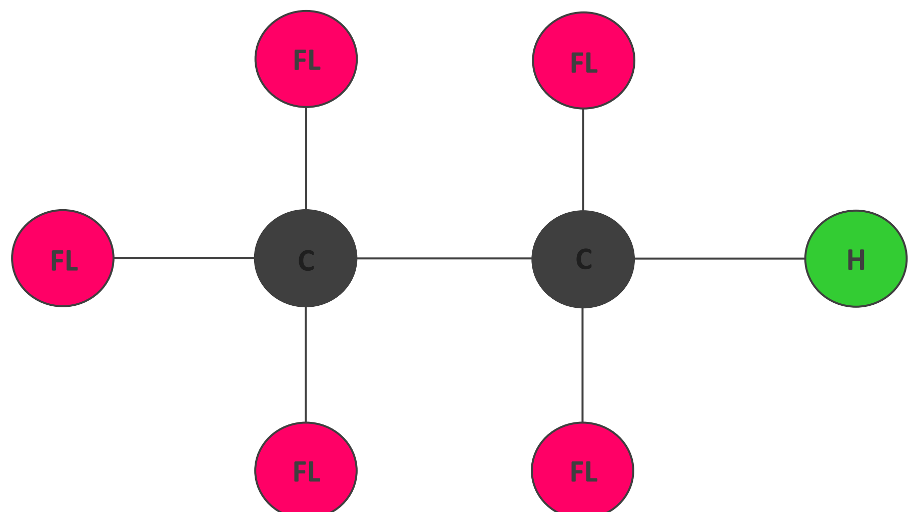


R-32

DIFLUOROMETHANE (HFC-32)

R-410A

- Pressure approximately 1.6 times that of R-22
- Higher density required smaller:
  - Compressor displacement
  - Heat exchangers
  - Refrigerant charge
  - Power consumption



R-125

PENTAFLUOROETHANE (HFC-125)

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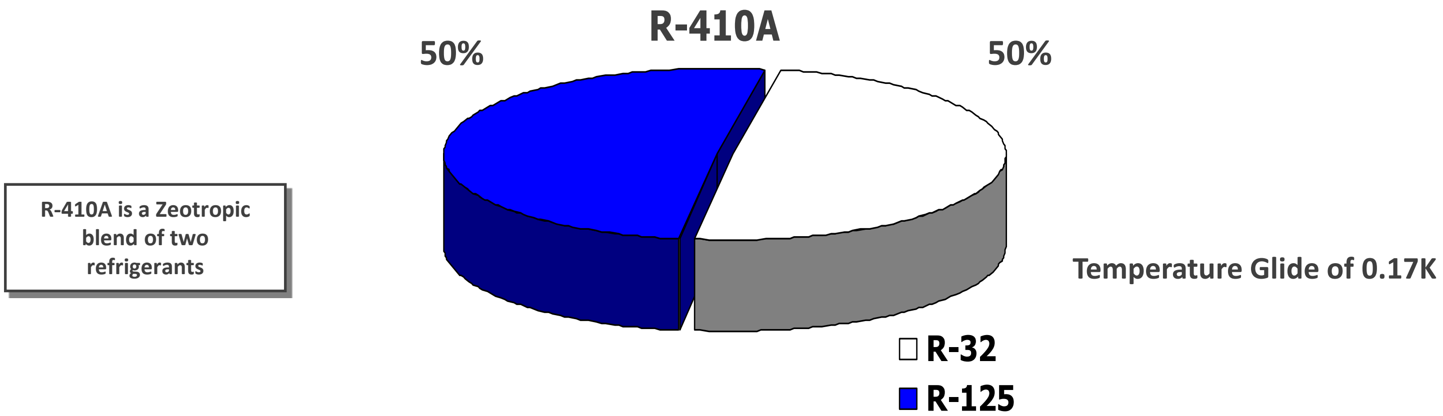
Daikin Altherma Refrigerant Piping Requirements (cont.)



- R-410A is a blend of two refrigerants. To achieve optimum performance, remove as a liquid from the cylinder.
- Store refrigerants in a clean, dry area out of direct sunlight.
- Never heat cylinders above 125°F(52°C).
- Recovery cylinder must be rated for R 410A
- 400 PSIG Pressure Rated
- DOT BA400, DOT BW400
- For more information www.epa.com

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Daikin Altherma Refrigerant Piping Requirements (cont.)

DAIKIN *uses:* **Polyvinyl Ether Oil, PVE**
Manufactured by IDEMITSU

- **Compatible with all HFC refrigerants (R134a,R404A, R407C, R410A)**
- **No Hydrolysis unlike POE (Polyester) Lubricants.**
- **Better solubility with process fluids.**
- **Unsurpassed Lubricity for greater wear protection.**
- **Optimum for Non-dryer System**

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Daikin Altherma Refrigerant Piping Requirements (cont.)

Split Systems (ERLQ)

Requirement	Size 018, 024, 030	Size 036, 048, 054
Maximum allowable refrigerant piping length between outdoor unit and indoor unit.	98.4 ft (30 m)	246 ft (75 m)
Minimum required refrigerant piping length between outdoor unit and indoor unit.	10 ft (3 m)	10 ft (3 m)
Maximum allow height difference between outdoor unit and indoor unit.	65.6 ft (20 m)	98.4 ft (30 m)
Refrigerant chargeless length - no additional charge required	≤32.8 ft (≤10 m)	≤98 ft (≤30 m)

Refrigerant Piping Specifications	Indoor Unit	Outdoor Unit
Gas Pipe Connection	5/8 inch (15.9 mm)	5/8 inch (15.9 mm)
Liquid Pipe Connection	1/4 inch (6.35 mm)	1/4 inch (6.35 mm)

Size 018, 024, 030

Use Only ACR Tubing

All Refrigeration Lines Must be Insulated

Refrigerant Piping Specifications	Indoor Unit	Outdoor Unit
Gas Pipe Connection	5/8 inch (15.9 mm)	5/8 inch (15.9 mm)
Liquid Pipe Connection	3/8 inch (9.5 mm)	3/8 inch (9.5 mm)

Size 036, 048, 054

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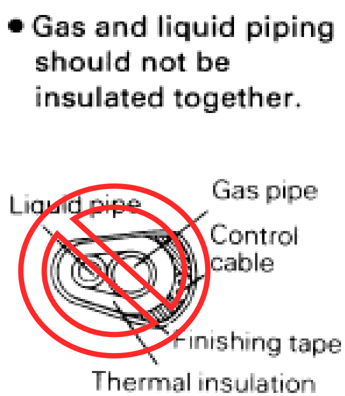
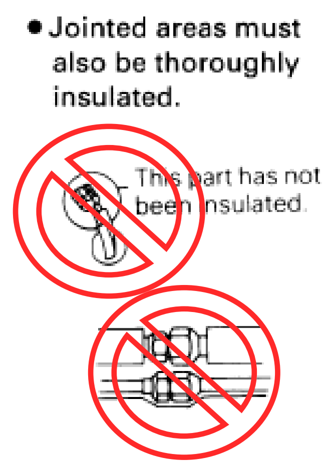
Daikin Altherma Refrigerant Piping Requirements (cont.)

- ALL pipe work must be insulated along it's full run.
- Altherma use minimum ½" wall insulation.
- Insulate flare nuts!
- NOTE: Local code for wall thickness/insulation should always be followed.
- Liquid line must be insulated due to possibility of excessive sub-cooling.





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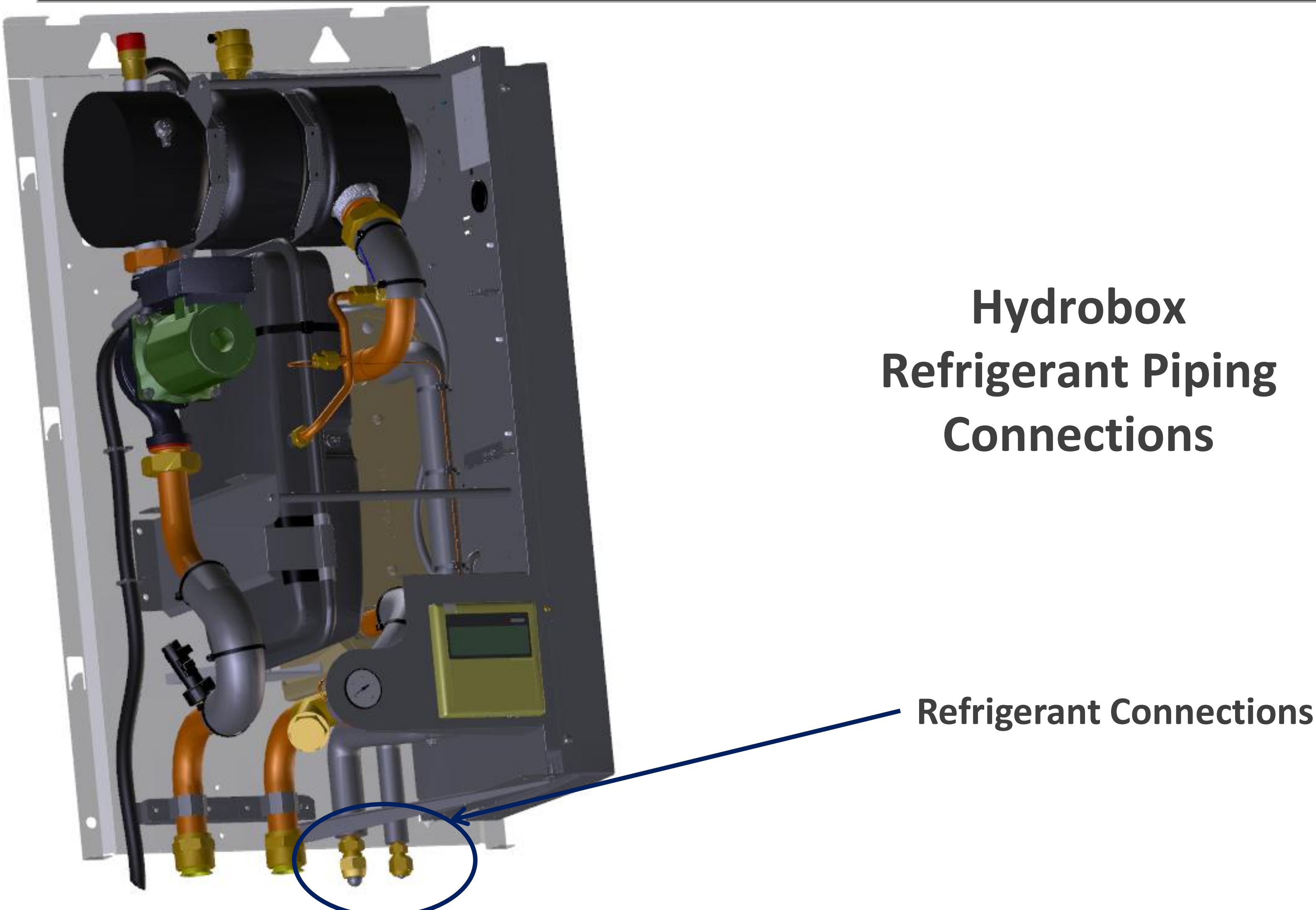
Daikin Altherma Refrigerant Piping Requirements (cont.)



Hydrobox Refrigerant Piping Connections

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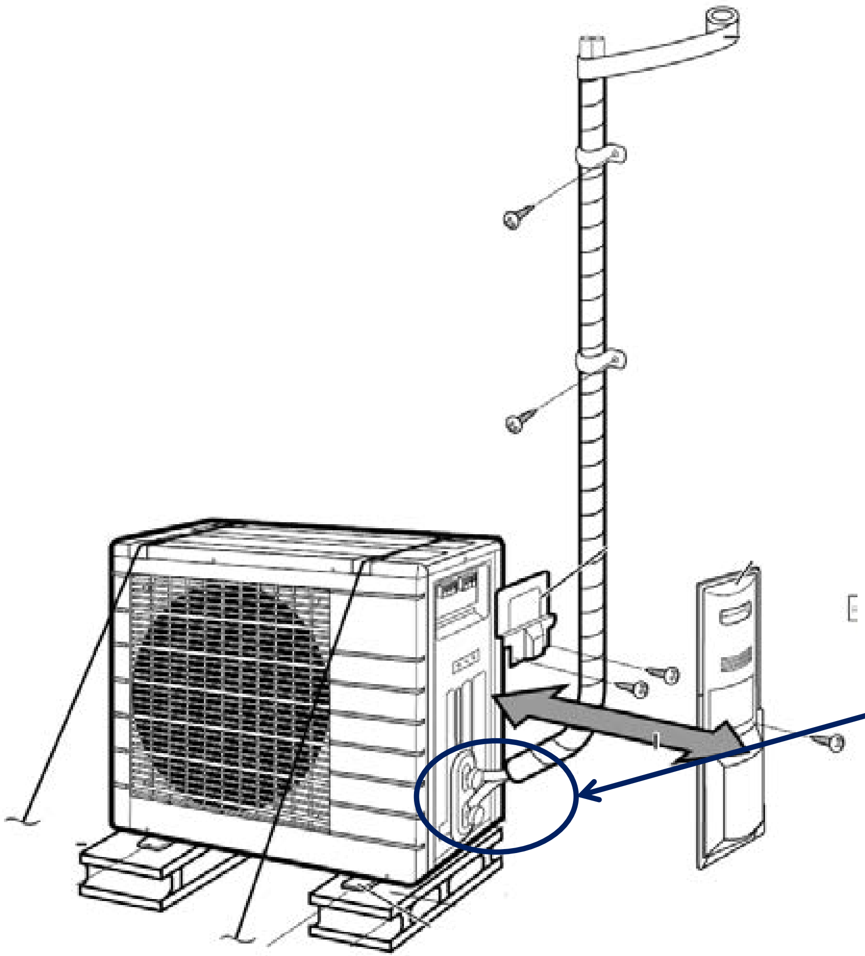
Daikin Altherma Refrigerant Piping Requirements (cont.)

ERLQ018/24/30BAVJU



Refrigerant Connections

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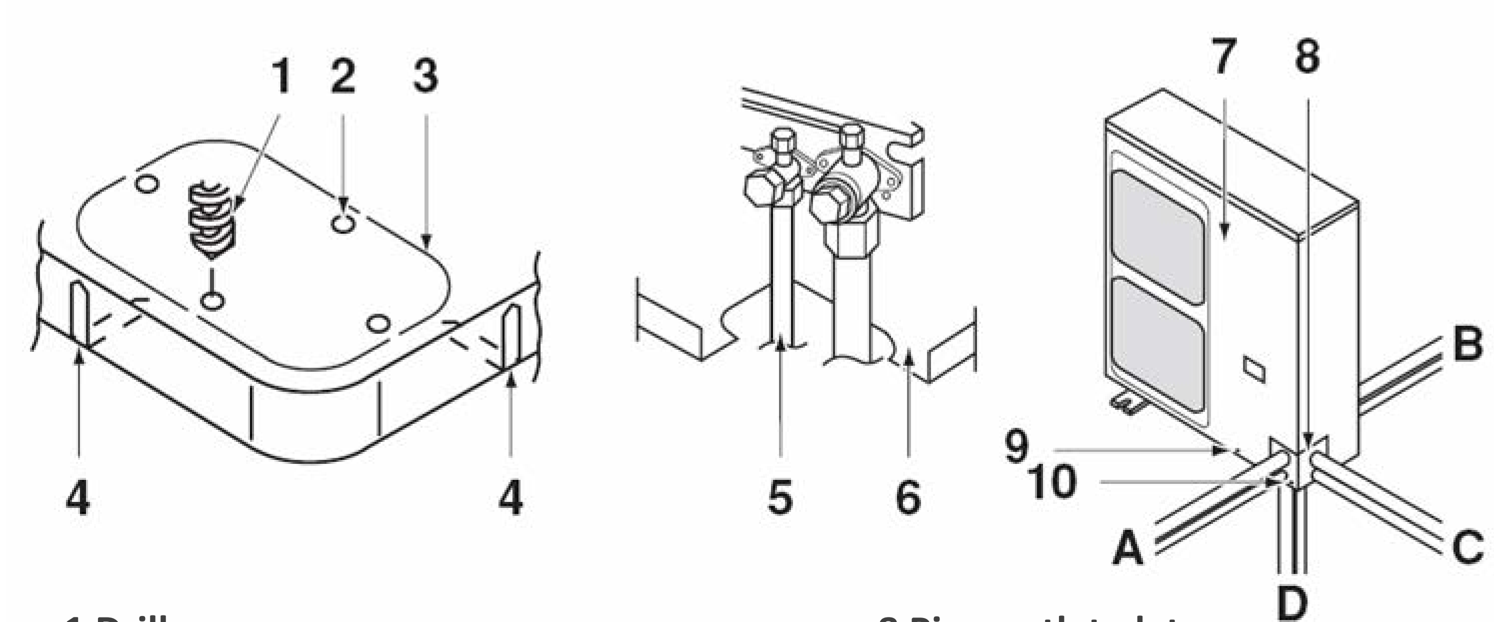
Daikin Altherma Refrigerant Piping Requirements (cont.)

ERLQ036/48/54BAVJU



1 Drill
2 Center area around knockout hole
3 Knockout hole
4 Slit
5 Connecting pipe
6 Bottom frame
7 Front plate
8 Pipe outlet plate
9 Screw front plate
10 Pipe outlet plate screw
A Forward
B Backward
C Sideways
D Downward

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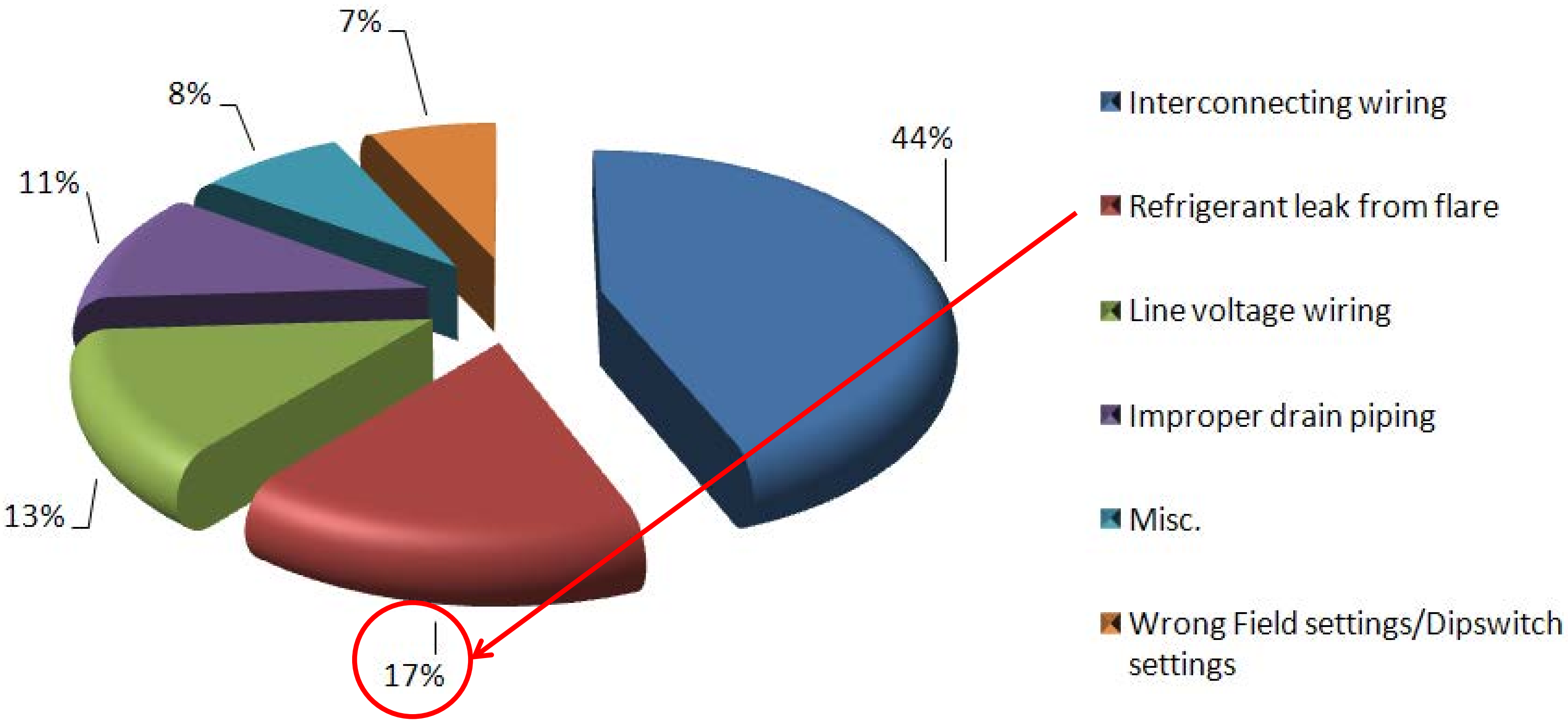
Daikin Altherma Refrigerant Piping Requirements (cont.)

Refrigerant Leaks from Improper Flares



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Daikin Altherma Refrigerant Piping Requirements (cont.)

Service Tool Kit (includes DACA-R410GS-1, DACA-CFK-1, DACA-TC-1, DACA-DT-1, & hard case)	DACA-99STK-1
Flare Size Gauge	DACA-FSG-1

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Daikin Altherma Refrigerant Piping Requirements (cont.)

Recommended Tools

Min. 600 PSI Delivery Pressure

Metric Allen Wrenches

5/16” to 1/4” Adapter

Daikin Altherma Refrigerant Piping Requirements (cont.)

Torque Wenches

Snap-on Industrial Brand CDI Torque 50T-I User Set Torque Wrench, Torque Range 15 to 75-Foot Pounds - Snap-on Industrial Brand CDI Torque Only 2 left in stock--order soon (more on the way). Eligible for FREE Super Saver Shipping This will be a gift (Learn more) Delete · Save for later	$104.60 You save: $96.47 (48%)	1
Snap-on Industrial Brand CDI Torque TCQZOM27A 27 Millimeter Open End Z Head - Snap-on Industrial Brand CDI Torque Only 1 left in stock--order soon (more on the way). Eligible for FREE Super Saver Shipping This will be a gift (Learn more) Delete · Save for later	$154.59 You save: $127.17 (45%)	1
Snap-on Industrial Brand CDI Torque TCQXOM22A 22 Millimeter Open End X Head - Snap-on Industrial Brand CDI Torque Only 1 left in stock--order soon (more on the way). Eligible for FREE Super Saver Shipping This will be a gift (Learn more) Delete · Save for later	$83.14 You save: $61.96 (43%)	1

Subtotal: $342.33

amazon.com

Qty.	Item	Detail & Cost	
1	CDI 75MFIMHSS Micrometer Adj Torque Wrench Interchange Head 5-75 ft. lbs. 75MFIMHSS	$161.69	$161.69
1	CDI Torque 22MM Open End Head "J" Shank TCQJOM22A TCQJOM22A	$96.14	$96.14
1	CDI Torque 27MM Open End Head "J" Shank TCQJOM27A TCQJOM27A	$142.54	$142.54

Update Subtotal: $400.37

PRO TORQUE TOOLS

CPS Metric Torque Wrench Set
Approximately $80.00

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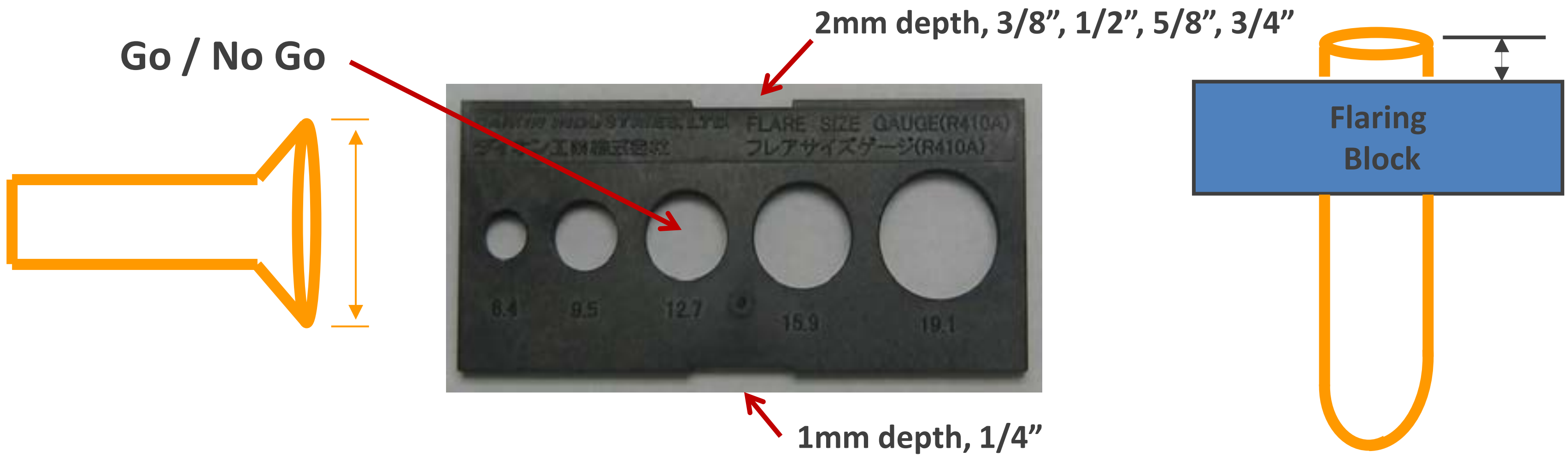
Daikin Altherma Refrigerant Piping Requirements (cont.)

How to make a proper flare

- To properly make a flare the pipe must be reamed prior to making flare, if it is not reamed the flare could leak due to burrs.
- Once the pipe has been reamed place flare nut on pipe and slide tubing up through flaring block using the flaring gauge on top of block as a depth gauge.
- When pipe bottoms out in gauge cutout clamp pipe, now place yoke on top and spin down to make flare.
- Check flare width by inserting into flare gauge



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Daikin Altherma Refrigerant Piping Requirements (cont.)

How to make a proper flare

- Dampen a rag with either PVE, POE or WD-40 and wipe flare’s face and back side of cone.
- Do not let fluids other than PVE or small amounts of POE inside piping
- Hand tighten flare and proceed tighten to assigned torque valve.
- Always use a backup wrench when tightening flares.

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Daikin Altherma Refrigerant Piping Requirements (cont.)

Torque Valves

To manually set a torque wrench use the below values based on pipe diameter being used.

Flare nut size	Standard tightening torque	
	Ft/lb	N/m
1/4	10.5 – 12.7	14.2 –17.2
3/8	24.2 – 29.4	32.7 – 39.9
1/2	36.5 – 44.5	49.5 – 60.3
5/8	45.6 – 55.6	61.8 – 75.4
3/4	68.4 – 87.5	92.7 – 118.6

Standard 3/8 Flare Nut

Daikin 3/8 Flare Nut

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Daikin Altherma Refrigerant Piping Requirements (cont.)

If no torque wrench is available, the following table can be used

- **Once the flare is assembled and hand tight, rotate wrenches the distance from each other using the chart below.**

Pipe size (in)	Further tightening angle (degree)	Recommended arm length of tool (in)
1/4"	60 to 90	Approx. 5 7/8"
3/8"	60 to 90	Approx. 7 7/8"
1/2"	30 to 60	Approx. 9 13/16"
5/8"	30 to 60	Approx. 11 13/16"

INAPPROPRIATE TIGHTENING TORQUE

Too tight

- **Reduced flare nut wall thickness - leakage**
- **Flare nut damage**

Too loose

- **Gas leak**

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Daikin Altherma Refrigerant Piping Requirements (cont.)

Only install driers, oil traps*, shut off valves or any other line components in your piping work if instructed to do so in the IOM documents – if no instruction, it's because it is NOT necessary (for Daikin).**

- * Altherma ERLQ036/48/54BAVJU will use traps on some installation configurations, consult Engineering Manual for more information
- ** Shut off valve can now be used if they meet temperature range and oil type.

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Daikin Altherma Refrigerant Piping Requirements (cont.)

Dry Nitrogen ***MUST*** be used during all brazing (Pressure regulated to 1.5 to 3 PSI) to prevent copper plate or oxidation formation

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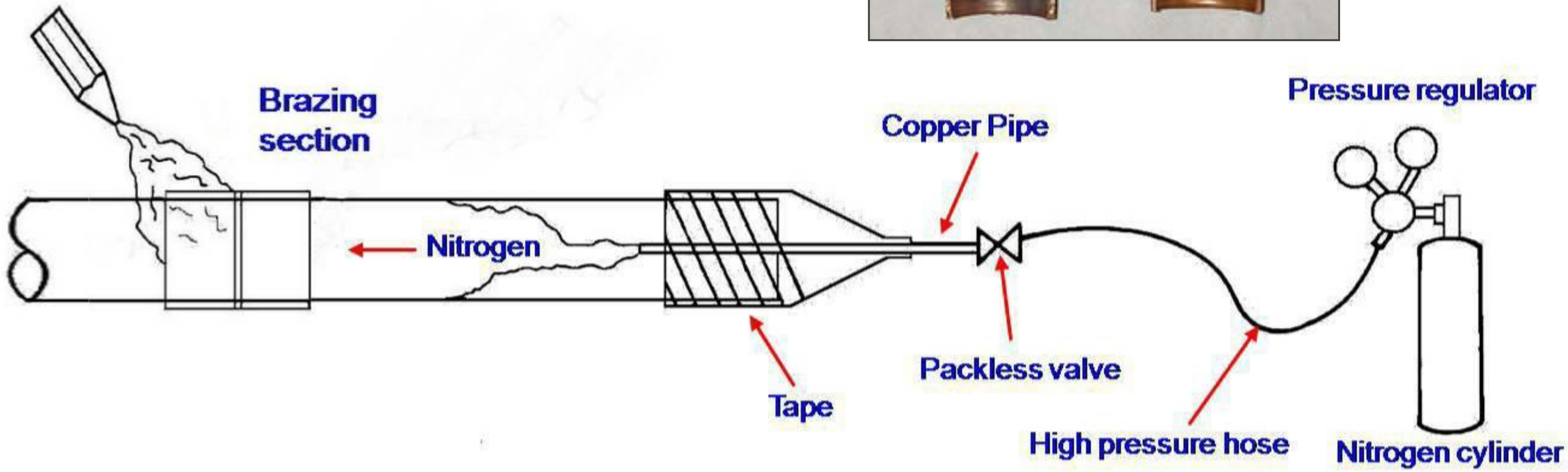
Daikin Altherma Refrigerant Piping Requirements (cont.)

- When Brazing always flow Dry Nitrogen through the pipe work.
- This prevents Oxidation and thus prevent contamination of the Refrigerant Circuit.
  - Problems caused include:
    - Insufficient Cooling or Heating
    - Degradation of Oil
    - Oxidation of Compressor

Without Nitrogen

With Nitrogen



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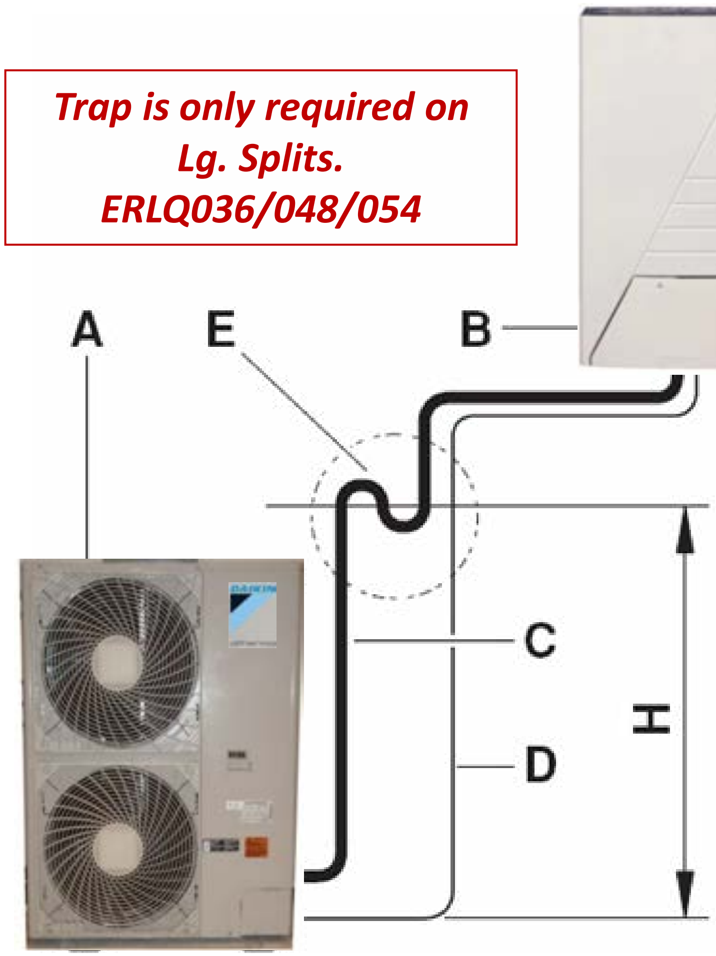
Daikin Altherma Refrigerant Piping Requirements (cont.)

Trap is only required on Lg. Splits. ERLQ036/048/054



Cautions for necessity of a trap

Since there is fear of the oil held inside the riser piping flowing back into the compressor when stopped and causing liquid compression phenomenon.

Install trap at each difference in height of 33ft. or 10m is required.

- Trap installation spacing.
  - A Outdoor unit
  - B Indoor unit
  - C Gas piping
  - D Liquid piping
  - E Oil trap
  - H Install trap at each difference in height of 33ft. or 10m.

NOTE: Oil trap is not necessary when the outdoor unit is installed in a higher position than the indoor unit.

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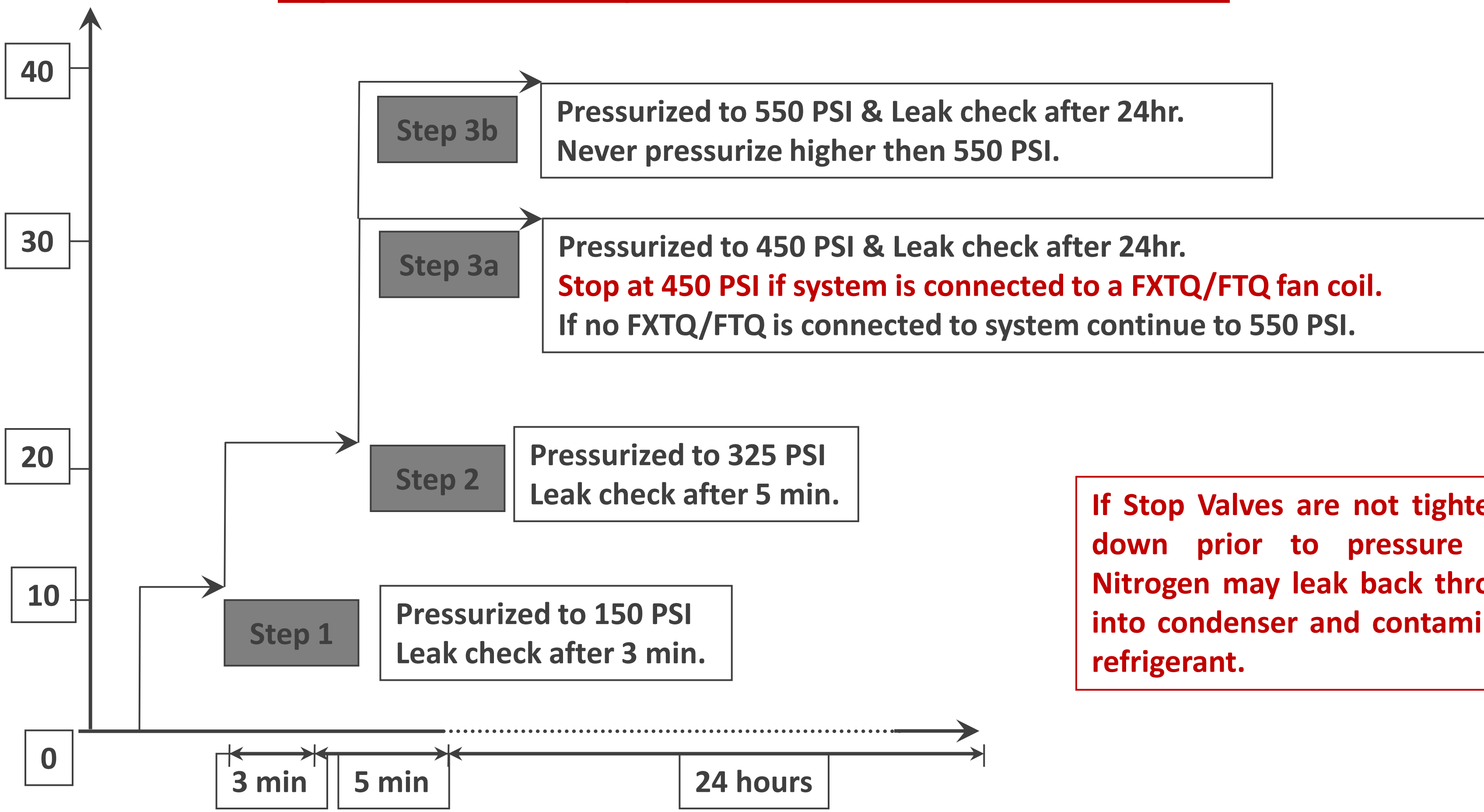
Daikin Altherma Refrigerant Piping Requirements (cont.)

Required Pressure Test

Tighten Down Stop Valves Before Pressure Test!!!



If Stop Valves are not tightened down prior to pressure test Nitrogen may leak back through into condenser and contaminate refrigerant.

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Daikin Altherma Refrigerant Piping Requirements (cont.)

Nitrogen Pressure Test Considerations

Nitrogen is subject to expansion and contraction due to ambient temperatures, use this formula to compensate for temperature changes from one day to the next when performing the 24 hour pressure test. The following formula will help do this.

Take the temperature when the system is pressurized (Tp) and subtract the temperature when the pressure is checked (Tc) and multiply by a factor of 0.80 to get the pressure drop (PD).

$$(T_p – T_c) \times 0.80 = PD$$

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Daikin Altherma Refrigerant Piping Requirements (cont.)

Vacuum Pump Requirements:

- Vacuum Pump needs a Check Valve to prevent Mineral Oil from being drawn into system.
- Capable of achieving 29 + inches of Vacuum
- Before welding or brazing, evacuate the equipment and then break the vacuum with nitrogen. Do not perform any repair on pressurized equipment.
- Opening a vacuum to atmosphere will allow moisture to enter the

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Daikin Altherma Refrigerant Piping Requirements (cont.)

Daikin Recommends Triple Evacuation Method

- A micron gauge <u>must</u> be used
- Do not energize the indoor units

1. Evacuate the piping to 4,000 microns
2. Break the vacuum with Nitrogen to a level of 2-3 PSIG hold for 20 minutes
3. Evacuate the system to 1,500 microns
4. Break the vacuum with Nitrogen to a level of 2-3 PSIG hold for 20 minutes
5. Evacuate the system to <u>below</u> 500 microns
    - Conduct a rise test; system should hold <u>below</u> 500 microns for 1 hour

NOTE: Vacuum Pump Check Valve should be used to prevent Mineral Oil from being drawn into the system. Schrader fittings are 5/16”. Use of an adaptor or proper hoses required

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Daikin Altherma Refrigerant Piping Requirements (cont.)

- **At the end of evacuation weigh in additional refrigerant with a digital scale**
- **The quantity of refrigerant necessary for optimum performance is determined by Daikin during extensive performance & reliability testing during product development.**
- **Calculate charge based on total line length x lb/ft of diameter.**
- **Check with each model for correct multiplier or adder.**

No Daikin Equipment Can Be Charged By Superheat or Sub-cooling Methods

Daikin Altherma Refrigerant Piping Requirements (cont.)

Adding Refrigerant Charge

- During evacuation verify refrigerant line lengths and compare to below chart.
- If no adjustment is necessary open stop valves to release charge in to piping.
- If additional charge is needed use a digital scale to weigh in required amount.
- Add R-410A as a liquid only, do not charge as a vapor.
- If factory charge needs to be removed, follow instructions on next slide.

Split Type systems (ERLQ018/24/30)

Requirement	
After charge-less length is exceeded add	.22oz/ft (20g/m)
No adjustment is needed below charge-less length {≤32.8 ft (≤10 m) max 98.4ft.}	

Split Type systems (ERLQ036/48/54)

Requirement
Piping between 9.84 & 16.4 ft, SEE NEXT SLIDE
Piping between 16.4 and 98.43 ft., no additional refrigerant is needed
Piping between 98.43 ~ 131.23 ft., add 1.1 lbs. of refrigerant
Piping between 131.23 ~ 164.04 ft., add 2.2 lbs. of refrigerant
Piping between 164.04 ~ 196.85 ft., add 3.31 lbs. of refrigerant
Piping between 196.85 ~ 246.06 ft., add 4.41 lbs. of refrigerant

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Daikin Altherma Refrigerant Piping Requirements (cont.)

Removing & Adjusting Refrigerant Charge for ERLQ036/48/54

- If factory charge needs to be removed do not open stop valves yet
- Attached reclaim mach. to port shown
- Reclaim and recharge based on below chart
- Weight charge into evacuated refrigerant pipes through liquid stop valve
- Open stop valves
- next slide.

Attached reclaim machine here

Split Type systems (ERLQ036/48/54)

Requirement
Piping between 9.84 & 16.4 ft, charge must be reclaimed and recharge total charge to 5.95lbs.

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Daikin Altherma Refrigerant Piping Requirements (cont.)

Optional Wall Bracket

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Attention Points on Water Circuit

- **Remove plastic shipping plugs before connecting water piping**

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Attention Points on Water Circuit (cont.)

- Altherma uses standard methods for hydronic system design
  - Installation of drain valves at the lowest places
  - Air vents at the highest level
  - All field piping must withstand the operating water pressure
  - Water quality must be according to “Safe Drinking Water Act (42 U.S.C 300f)”.
- Install factory supplied shut-off valves at inlet and outlet of hydrobox
- Minimum water pressure 4.3 PSI

Factory Supplied Shut Off Valves

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Attention Points on Water Circuit (cont.)

- **All Daikin supplied parts and equipment water connections are BSP, not NPT**
  - **BSP/NPT fitting kits are available from Daikin**
- **BSP and NPT are not the same thread, 55º verse 60º angled peaks/valleys and more**
- **Daikin does not support the use of mixing BSP & NPT threads**
- **Consult Sales Bulletin RSS-001 for more details**

Application	Part Number	List Price	Note
Hydrobox / Hydro-section	DACA-HBA-1	$ 40.00	2 fittings included, Bagged and Labeled
	DACA-HBA-2	$ 30.00	2 fittings included, Bagged and Labeled
	DACA-HBA-3	$ 42.00	2 fittings included, Bagged and Labeled
3-Way Valve (DHW)	DACA-3WVTA-1	$ 20.00	1 fitting included, Bagged and Labeled Refer to summary diagram for Qty
	DACA-3WVTH-1	$ 15.00	1 fitting included, Bagged and Labeled Refer to summary diagram for Qty
DHW Tank / Solar Kit	DACA-THXA-1	$ 28.00	2 fittings included, Bagged and Labeled
	DACA-DHWTA-1	$ 22.00	2 fittings included, Bagged and Labeled
Replacement	DACA-MP-1	$ 10.00	Only needed if Re-circ or Anode is removed
Recirculation	DACA-DHWRA-1	$ 9.00	Only needed if Re-circ connection is being utilized

Notes: 1. Normal customer multipliers apply for net pricing
2. List pricing is effective June 1, 2011

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Attention Points on Water Circuit (cont.)

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Minimum Water Volume

Small Split – 018,024,030

- **Minimum water volume**
  - **Heating only model: 2.64 gal / 10 liter**
  - **Heating / Cooling model: 2.64 gal / 10 liter**

Large Split – 036,048,054

- **Minimum water volume**
  - **Heating only model: 5.28 gal / 20 liter**
  - **Heating / Cooling model: 5.28 gal / 20 liter**

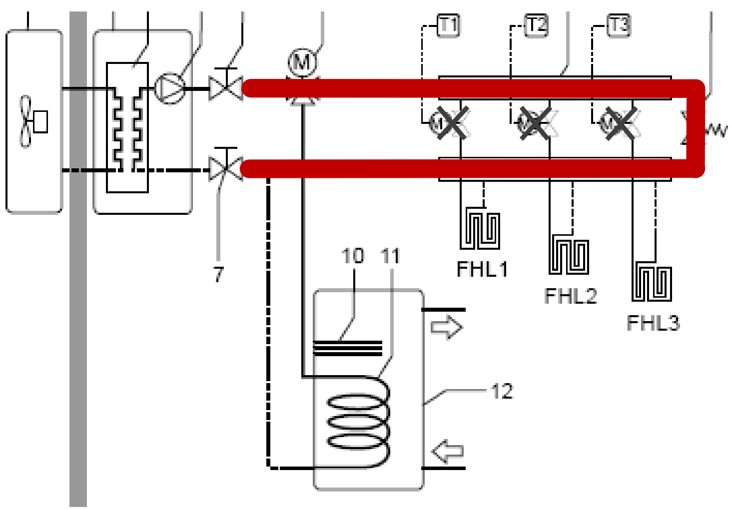
Attention Points on Water Circuit (cont.)

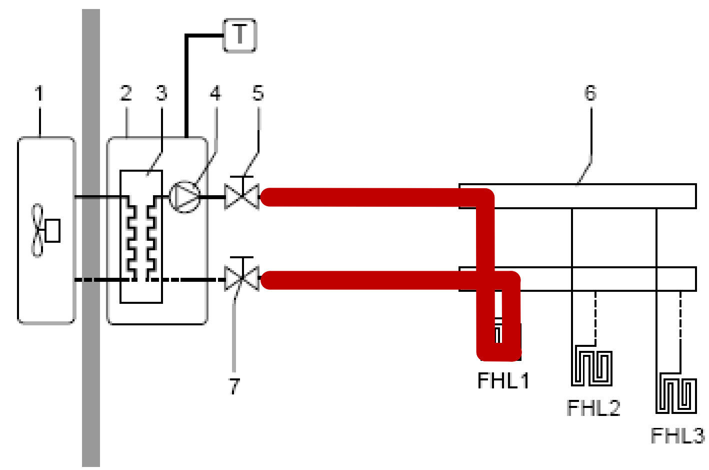
!!! Caution !!!

The minimum water volume of the system is the available water volume in the most critical

The most critical situation in this type of installation is in case when all valves are closed. Available water volume is only main piping loop.

This application requires each zone on its own needs to meet the minimum water volume.





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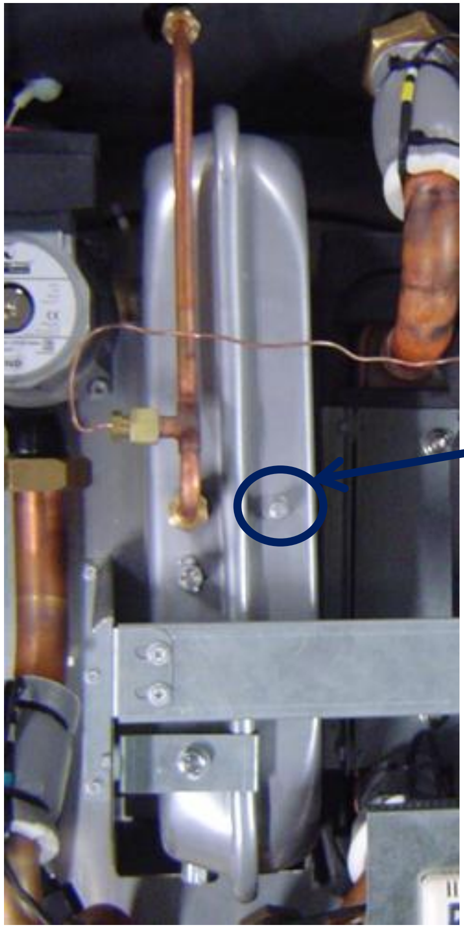
Attention Points on Water Circuit (cont.)

Setting Expansion Vessel



- Factory pre-pressure for the expansion vessel is 14.5 PSI (1 bar), keep in mind the following guidelines:
  - Use dry nitrogen to set the expansion vessel pre-pressure
  - Inappropriate setting of the expansion vessel pre-pressure can lead to malfunction of the system
  - Charging point to adjust the pressure inside the expansion vessel.
  - Water volume expansion vessel: 2.642 gal / 10 liter

Follow the installation instructions on how to adjust pressure of tank if the application requires adjustment.

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Attention Points on Water Circuit (cont.)

Setting Expansion Vessel

How to set internal expansion tank

- Measure each size pipe and use correct chart to find distribution systems internal volume.
- Fan coil units, radiant zones and any other emitters should be included in calculations.
- Internal volume of Altherma equipment should be included too, see equipment specs.

Type M Copper Internal Volume	
¾”	37’ = 1 gal (0.0269 gal per ft)
1”	22’ = 1 gal (0.0454 gal per ft)
1 ¼”	15’ = 1 gal (0.0681 per ft)
1 ½”	11’ = 1 gal (0.0951 per ft)
2”	6’ = 1 gal (0.165 per ft)

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Attention Points on Water Circuit (cont.)

Setting Expansion Vessel

- Using the table to the right determine if any action will be needed.
- If the pressure needs to be adjusted
- The pre-pressure (Pg) to be set depends on the maximum installation height difference (H) and is calculated as below: Pg (PSI)=(H÷32+0.3) X 14.5

Installation height difference[a]	Water volume	
	≤74 gallons (280 l)	>74 gallons (280 l)
≤23 ft (≤7 m)	No pre-pressure adjustment required.	Actions required: • pre-pressure must be decreased, calculate according to "Calculating the pre-pressure of the expansion vessel" • check if the water volume is lower than maximum allowed water volume (use graph below)
>23 ft (>7 m)	Actions required: • pre-pressure must be increased, calculate according to "Calculating the pre-pressure of the expansion vessel" • check if the water volume is lower than maximum allowed water volume (use graph below)	Expansion vessel of the unit too small for the installation.

(a) Installation height difference: height difference (ft)(m) between the highest point of the water circuit and the unit. If the unit is located at the highest point of the installation, the installation height is considered 0 ft (0 m).

Example 1:

- Install is 16.4' of height separation and the volume is 26.4 gal.
- No action required

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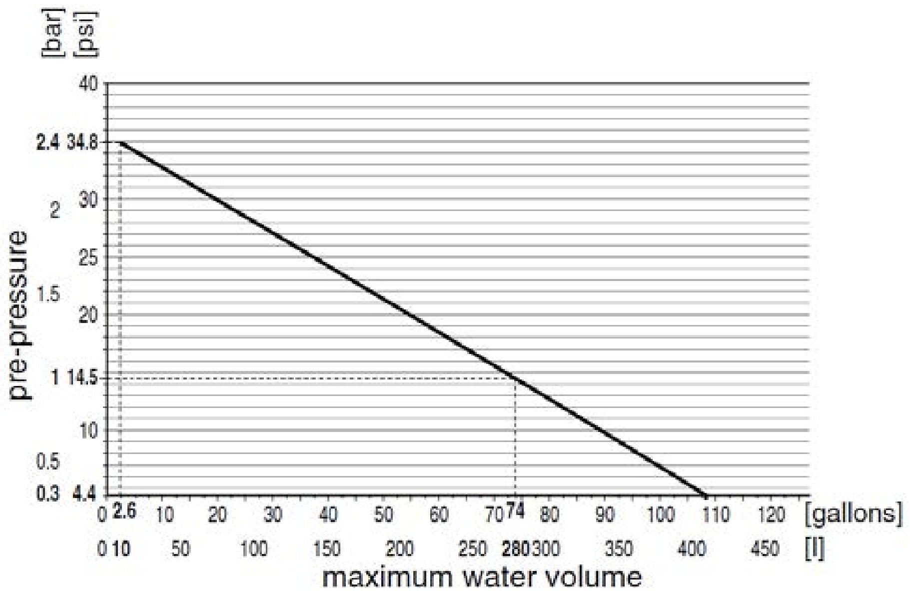
Attention Points on Water Circuit (cont.)

Setting Expansion Vessel

- **Determine water volume of system**

Example 2:

- **Hydronic section installed at highest point in water circuit. The total water volume is 92.5 gal. Height = 0.**
- **(0÷32+0.3) x 14.5 = 4.4 PSI**
- **4.4 PSI will allow for 108 gal of water, on board tank will suffice adjust tank to 4.4 PSI.**



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Cooling Installations – Cooling Drain Pan Kit EKHBDP

Contents of Drain Pan Kit

- Instruction sheet
- Screws
- Pipe brackets
- Tie-wraps
- Drain pan assy., 3 pieces
- Insulation
  - For inlet water pipe
  - Outlet water pipe
  - Suction pipe
  - Liquid pipe
- Follow the pictures to install correctly.
- Use the provided screws!

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Possible Wiring Configurations

The Altherma can be configured in many different ways, here are the different options:

1. Space Heating Only
2. Space Heating & DHW Production
3. Space Heating & DHW Production (With Solar)
4. Space Heating & Space Cooling
5. Space Heating, Space Cooling & DHW Production
6. Space Heating, Space Cooling & DHW Production (With Solar)
7. Space Cooling Only
8. Space Cooling, DHW Production
9. Space Cooling, DHW Production (With Solar)
10. DHW Production
11. DHW Production (With Solar)

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Control Box – X2M Terminal Block

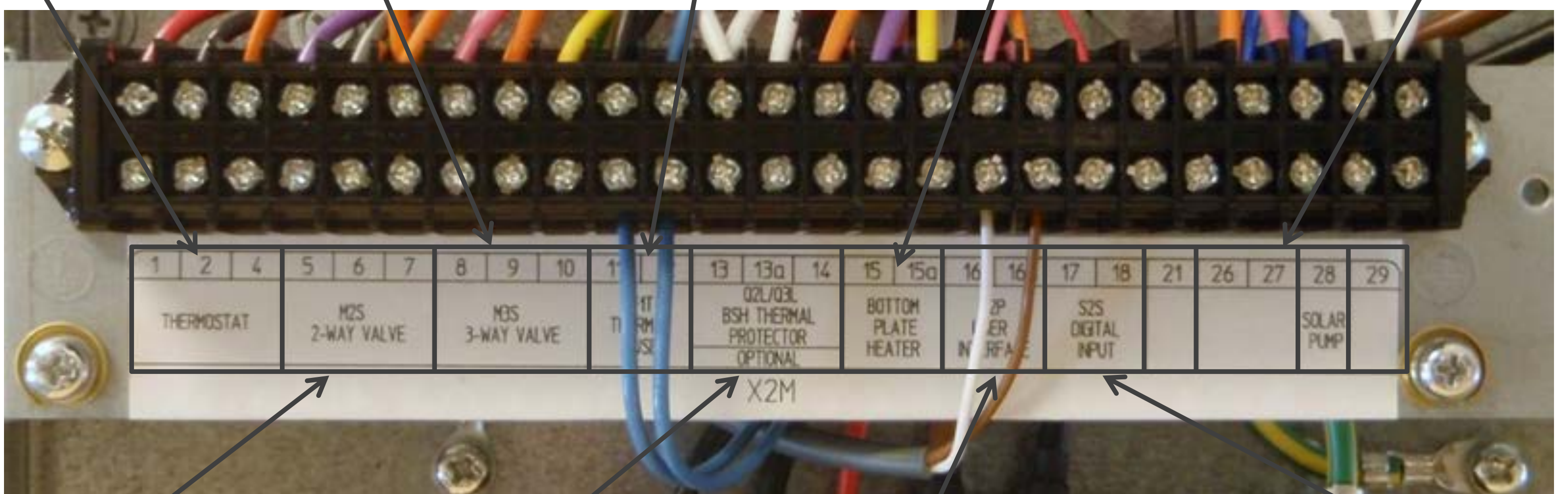
Thermostat
1, 4 Heating – 24VAC
2, 4 Cooling – 24VAC

3-way Valve
24 VAC 100mA max.
8, 9 Heating – 24VAC
9, 10 DHW – 24VAC

Thermal Fuse
11, 12 –
208/240VAC

Bottom Plate Heater
15, 15a – 208/240VAC

21 – EKRP1HB
26, 27 – 24VAC & EKRP1HB
28 – EKRP1HB
29 – Not used



2-way Valve (Cooling)
24 VAC 100mA max.
5, 7 Normally Closed – 24VAC
6, 7 Normally Open – 24VAC

DHW Tank Q3L Safety
13, 14 – 208/240VAC

13a – Solar Pump
208/240VAC

User Interface
16, 16a – 15VDC
Do not connect any other control to these connections

Digital Input – Time of Use Utility Rate (Benefit kWh)
17, 18 – voltage free contacts

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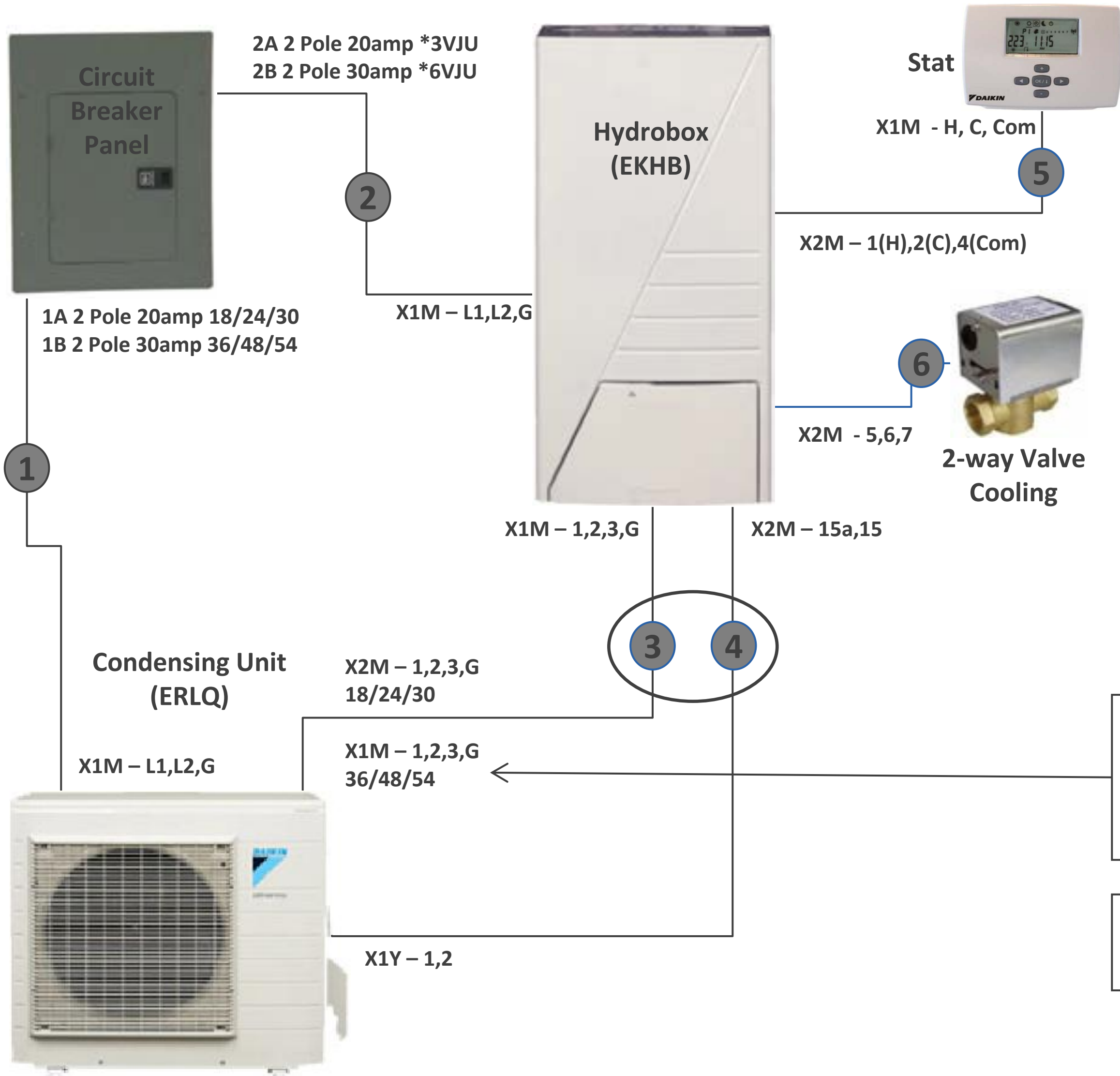
* Electrical work is to comply with ALL local electrical codes

Altherma Field Wiring for Split System



Typical Wire & Breaker Sizes*			
	Wire #	Qty - Gauge	Notes:
Heating	1A	3 - #12	20amp 2 Pole
	1B	3 - #10	30amp 2 Pole
	2A	3 - #12	20amp 2 Pole
	2B	3 - #10	30amp 2 Pole
	3	4 - #12	- - -
	4	2 - #12	- - -
	5	2 - #18 min.	- - -
Cooling	6	Optional – 24VAC Circuit 100mA max. refer to 3rd party valve spec	

NOTE: Wires 1, 2 & Ground can have junctions if needed, but wire #3 should be run point to point, no junctions or breaks in between. This is to prevent communication errors.

Wires: 3 & 4 can be run together*
Both sets of wires have 208/240VAC present

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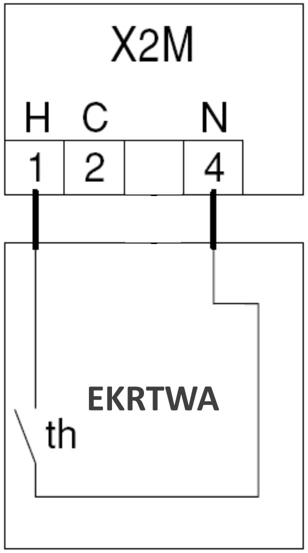
* <u>Electrical work is to comply with ALL local electrical codes</u>

Low Voltage Wiring – Thermostat

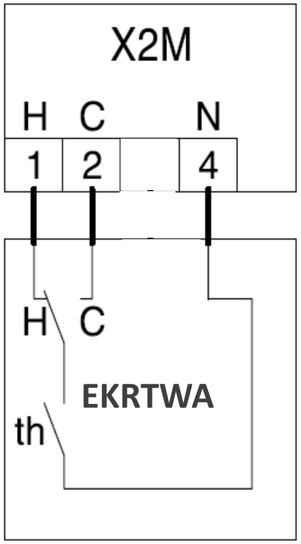
Connection of a Daikin thermostat

- **The Daikin thermostat is for Radiant applications only, no fan operation available**
- **When installing a EFWT fan coil, it is recommended to use a third party thermostat that can control fan operation on hydronic applications**

Heating only



Heating/Cooling



EKRTWA

NOTE:
24VAC is present between terminals 1 & 4 and 2 & 4

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Low Voltage Wiring – External Control Connections

Connection of the third party thermostat/control

Heating only

X2M		
Heating		Com
1		4

Heating/Cooling

X2M		
Heating	Cooling	Com
1	2	4

NOTE:
24VAC is present between terminals 1 & 4 and 2 & 4

- **Third party controls can be used on Daikin Altherma**
- **Dry contacts only (voltage free)**
- **Be careful when opposing control voltages are present**
- **Isolation relays may be needed depending on application**

Simultaneous Call

It is important when wiring multiple zones that precautions are taken so that a simultaneous call for Heat & Cool cannot occur. In the event that a simultaneous call does occur for Heat & Cool, the unit will stop operating until one of the calls is removed. DHW mode will still operate normally during a simultaneous call.

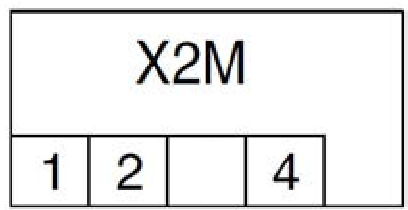
* Electrical work is to comply with ALL local electrical codes

Low Voltage Wiring – No Thermostat

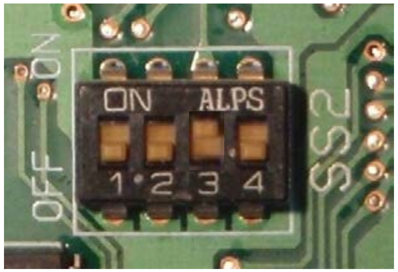
When no thermostat is connected to the indoor unit, pump operation will be determined by the leaving water temperature.

The operation of the Altherma will be controlled by the User Interface

No wiring is needed



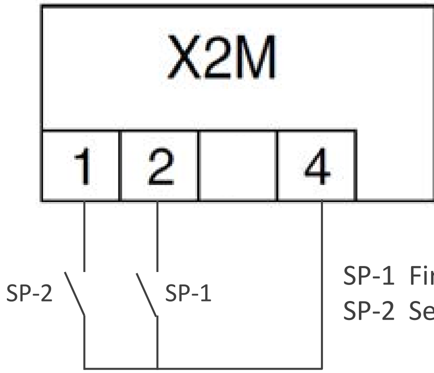
Leave DIP switch 3 OFF



DIP Switches on Main PCB

Low Voltage Wiring – Wiring Dual Set-point

- **Second set point heating should be linked to the heat emitters which requires the highest set point in heating mode.**
- **Second set point cooling should be linked to the heat emitters which requires the lowest set point in cooling mode.**
- **NOTE: When dual set point is enabled, heating/cooling change over must be done manually at user interface.**



SP-1 First set point contact
SP-2 Second set point contact

Set Field Settings for Dual Set-point operation: 7-02, 7-03, 7-04.
(See Installation Manual of the hydrobox for more information)

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2-way Valve Installation

- **On some installations a 2-way valve may be needed to isolate different heating/cooling emitters in the hydronic circuit**
- **A field supplied 24VAC valve 100mA max., either NO or NC can be wired to hydrobox terminals X2M – 5,6,7 see below**
- **2-way should have a 60 second cycle time or less**
- **On a call for Cooling this valve will be energized to insure only chilled water is sent to the cooling emitters**
- **If a call for DHW occurs during the call for Cooling the valve will remained energized until the DHW call and Cooling call is satisfied**

2-way Valve	hydrobox – X2M
Normally Closed	Terminals 5 & 7
Normally Open	Terminals 6 & 7

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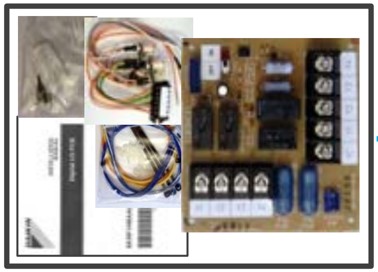
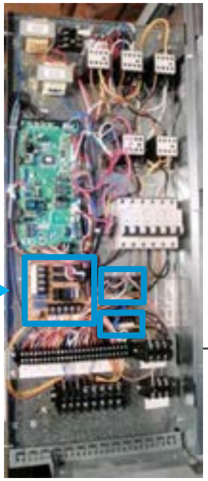
* **Electrical work is to comply with ALL local electrical codes**

Altherma Co-valent Wiring for ERKP1HBAAU adapter

This Co-valent scenario uses the Heating & Cooling ON/OFF outputs of the EKRP1HB Digital I/O PCB Kit – X7M 3, 4





Daikin Altherma Control Box

X7M – 3, 4

T775

Field Supplied Outdoor Stat

T & T Contacts

Field Supplied Heat Source

EKRP1HBAAU comes with
A4P PCB
K5A, K6A, K7A relays
X7M terminal block
Screws and installation diagrams

In Co-valent applications the field supplied heat source takes the place of the internal backup heater.

Altherma & the second heat source are piped in series so the internal water pump of the Altherma can be utilized to move water through the other heat source.

It is important that the entering water temp to the Altherma is lower than 149ºF/65ºC, if higher an error and shut down will result.

Field Setting [4-00] = 0 – Disables backup heater

The field supplied outdoor stat should be set to the temperature at which additional heat is needed to maintain the load. Also the stat will need to be set to turn OFF the heat source at a higher outdoor ambient when no more heat is needed, example 60ºF/15ºC, this will stop the second heat source from running during cooling mode.

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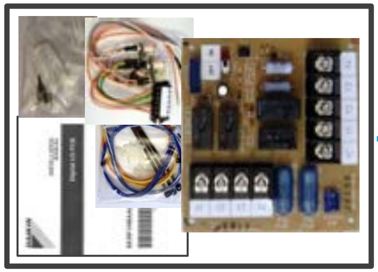
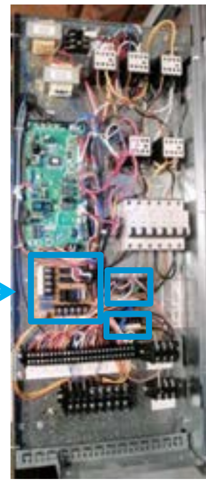
* **Electrical work is to comply with ALL local electrical codes**

Altherma Bi-valent Wiring for ERKP1HBAAU adapter

EKRP1HBAAU comes with
A4P PCB
K5A, K6A, K7A relays
X7M terminal block
Screws and installation diagrams





Daikin Altherma Control Box

A4P – X1, X2

J

Typical Wire Sizes*			
	Wire #	Qty - Gauge	Notes:
Control wire	J	2 - #18	- - -

Set Field Settings for Bi-valent operation:
C-02, C-03, C-04.
(See Installation Manual for more information)

X1, X2 Terminals (dry contacts, no voltage present)
Maximum Load: 1A-24VAC
Minimum Load: 20mA-5VDC

Field Supplied Heat Source

T & T Contacts

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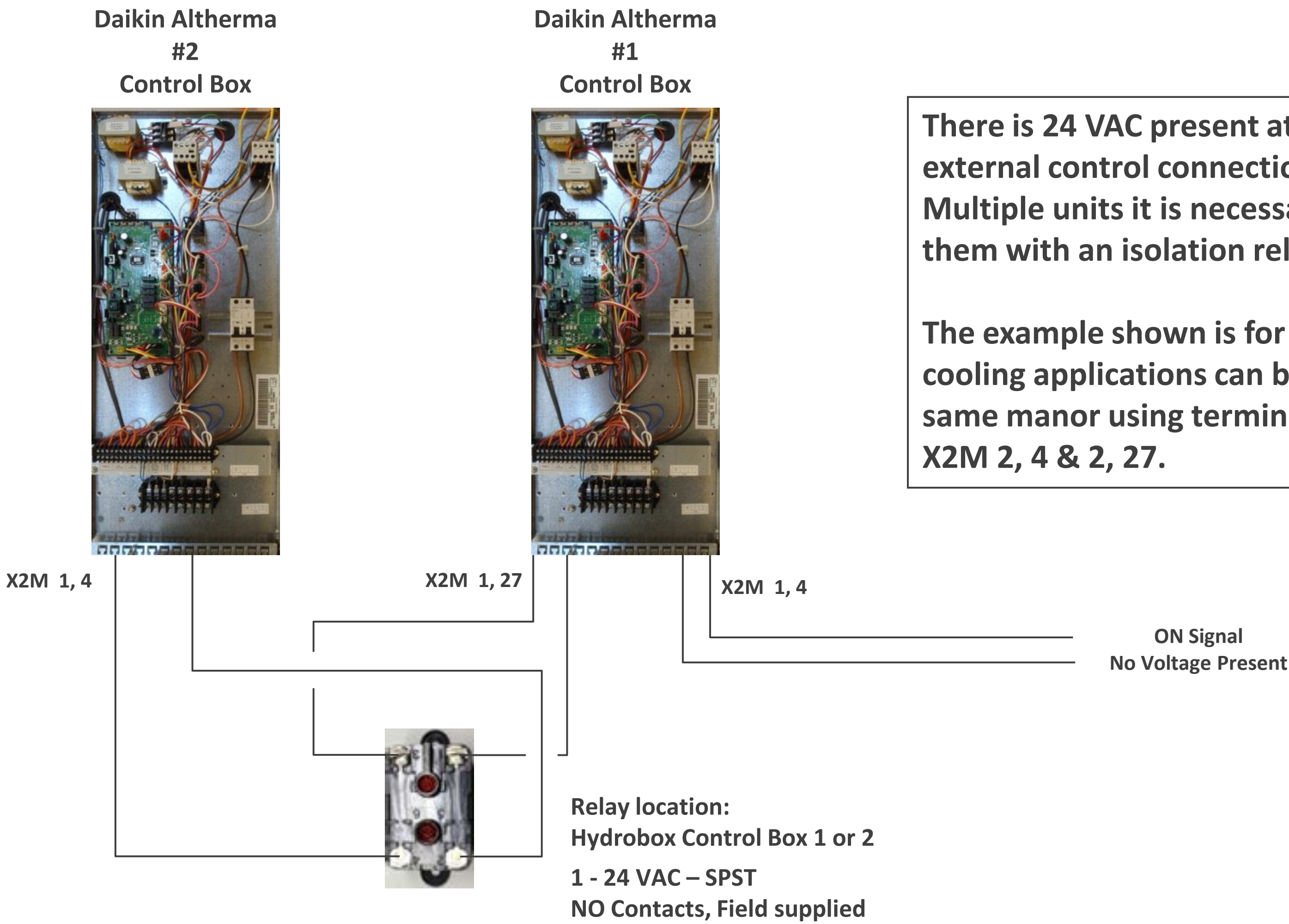
Multi Daikin Altherma Wiring



There is 24 VAC present at each Altherma external control connection, when wiring Multiple units it is necessary to separate them with an isolation relay.

The example shown is for heating only, cooling applications can be done in the same manor using terminals;
X2M 2, 4 & 2, 27.

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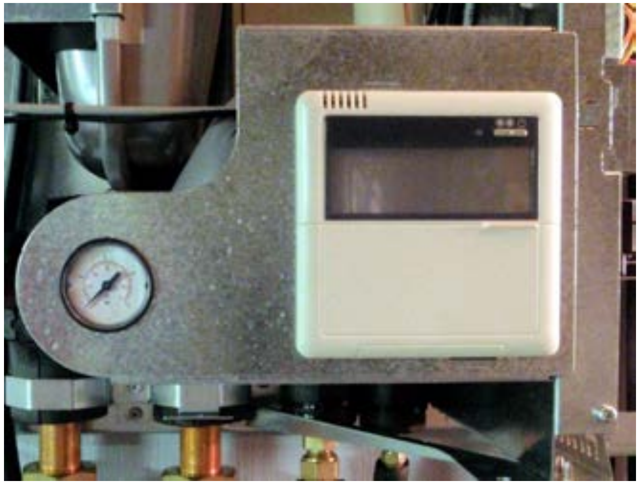
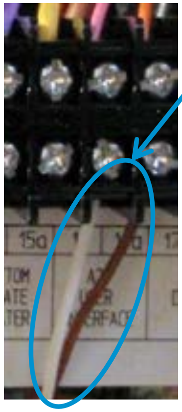
Low Voltage Wiring – Relocation of Remote Controller

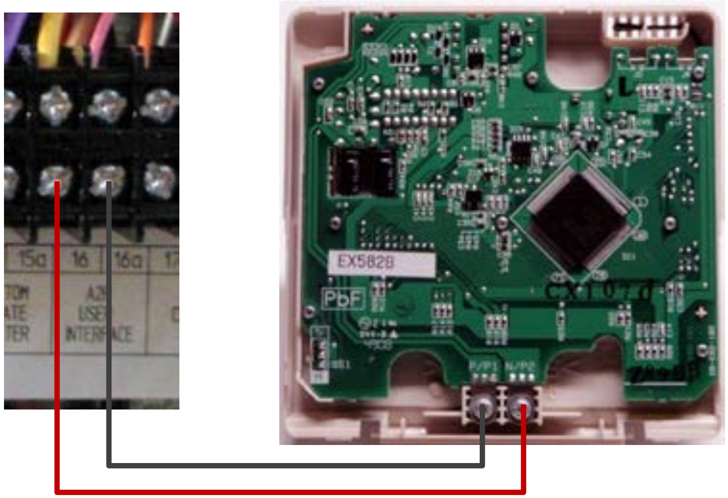
User Interface can be relocated if needed.

- Remove controller from front of hydrobox and disconnect wires connected to P1/P2.
- Remove the disconnected wire harness from unit.
- Install new wire from hydrobox (X2M-16/16a) to User Interface (P1/P2).
- These wire <u>should not have a junction in them</u>, run wires point to point
- Use 16 or 18 gauge wire, non-shielded, stranded copper wire.
- Maximum length can be 1,640 feet.

Remove and discard wire harness







Next Steps

After installation is complete and the system is ready to be started. Startup techs can utilize the Commissioning Report and Quick Startup Guide to finish the job.

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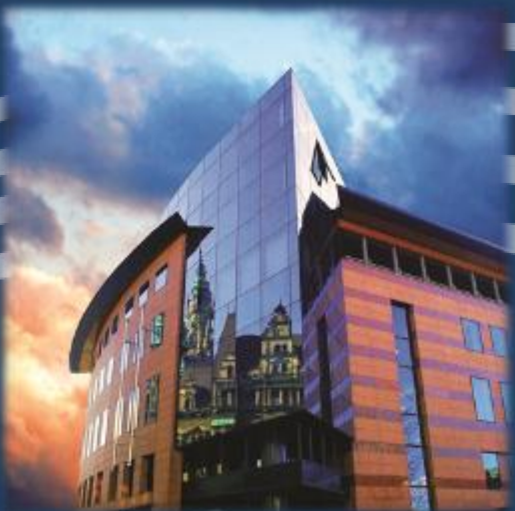
For more detailed information check Daikin's Engineering, Installation, Operation and Service manuals.
Available at www.daikinac.com

Thank You

Daikin Altherma™





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MonoBloc Installation

Installation Topics

- Daikin Altherma Main & Optional Component Model Numbers
- Equipment Specifications
- Clearance & Service Space
- Internal Component Layout
- Cold Climate Considerations
- Freeze Prevention Settings
- Refrigerant Statement
- Attention Points on the Water Circuit
- Field Wiring – High & Low Voltage
- Installation of optional 2-way Valve for Cooling Installations
- Remote Controller Installation
- Next Steps

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Altherma Main Component Model Numbers

- MonoBloc
  - Heating Only
    - EDLQ036BA6VJU
    - EDLQ048BA6VJU
    - EDLQ054BA6VJU
  - Heating/Cooling
    - EBLQ036BA6VJU
    - EBLQ048BA6VJU
    - EBLQ054BA6VJU

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Optional Component Model Numbers

- Digital I/O PCB
  - EKRP1HBAAU
    Can be used for Bi-valent & Co-valent applications, thermal on signal and alarm output
- BSP to NPT Adapters
  - DACA-HBA-3 (1¼" Male BSP x 1¼" Male NPT)
- Thermostat
  - EKRTW

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Althterma MonoBloc Specifications

		ED(B)LQ036 / ED(B)LQ048 / ED(B)LQ054
Refrigerant	Type	R-410A
	Charge	6.5 lb. / 2.95 kg (sealed system)
Dimensions	Height	55 7/8 inch / 1418 mm
	Width	56 1/2 inch / 1435 mm
	Depth	15 1/32 inch / 382 mm
Weight		397 lb. / 180 kg
Compressor Type		Hermetically Sealed Scroll Compressor
Compressor Model		JT100G-VD
Oil Type		Daphne FVC68D

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Altherma MonoBloc Specifications

		ED(B)LQ036	ED(B)LQ048	ED(B)LQ054
Power Supply		1 ~ 208/230 VAC / 60Hz / 30 Amp Breaker		
Operation Sound [dBA] Heat		64	64	66
Operation Sound [dBA] Cool		65	66	69
Low Noise Heat		42	42	43
Low Noise Cool		45	45	46
Operation Range Air side	Cooling EBLQ units Only	114 ~ 50° FWB / 46 ~ 10° CWB		
	Heating	95 ~ -4° FDB / 35 ~ -20° CDB		
	Hot Water	95 ~ -4° FDB* / 35 ~ -20° CDB*		
Operation Range	Cooling water side EBLQ units Only	41 ~ 71.6° F / 5 ~ 22° C		
	Heating water side	15 ~ 55° C (15 ~ 25° C BUH only) 59 ~ 131° F (59 ~ 77° F BUH only)		

* Booster heating operation from 95ºF/35ºC / ** Charge adjustment will be necessary

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Altherma MonoBloc Specifications

		ED(B)LQ036	ED(B)LQ048	ED(B)LQ054
Power Supply Backup Heater	6VJU	1 ~ 208/230 VAC / 60Hz - 6kW / 30 Amp Breaker		
Piping Water	Water In/Outlet	1 - 1/4” Female BSPT		
Internal Water Volume		1.45 gal / 5.5 l		
Pressure Relief Valve Water Circuit		43.5 PSI / 3 bar		
Pump	Type	Water Cooled, Internal		
	# of Speeds	2 (High & Low (Low & Med same))		
Minimum Water Flow		4.23 GPM		
Maximum Water Flow		15.3 GPM		

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Altherma MonoBloc Specifications

Altherma	Mode	Unit	EDLQ 036	EDLQ 048	EDLQ 054	EBLQ 036	EBLQ 048	EBLQ 054
Nominal ESP unit	Cooling	Ft. of Hd.	- - -	- - -	- - -	18.7	16.4	15.7
		PSI				8.1	7.1	6.8
	Heating	Ft. of Hd.	17.6	14.6	11.6	17.6	14.6	11.6
		PSI	7.6	6.3	5.0	7.6	6.3	5.0
Water flow rate at Nominal ESP	Cooling (1)	GPM	- - -	- - -	- - -	9.72	12.13	12.68
		PSI				36.8	45.9	48.0
	Heating (2)	GPM	8.48	10.59	12.13	8.48	10.59	12.13
		l/m	32.1	40.1	45.9	32.1	40.1	45.9
Minimum flow	all	GPM	4.23					
		l/m	16.0					
Maximum flow		GPM	15.32					
		l/m	58.0					

1. Outside Temp 95°F (35°C) – Leaving water evaporator temp 44.6°F (7°C) (DT = 9°F (5°C)
2. Outside Temp DB/WB 44.6°F/42.8°F (7°C/6°C) – Leaving water condenser temp 95°F (35°C) (DTΔ = 9°F (5°C)

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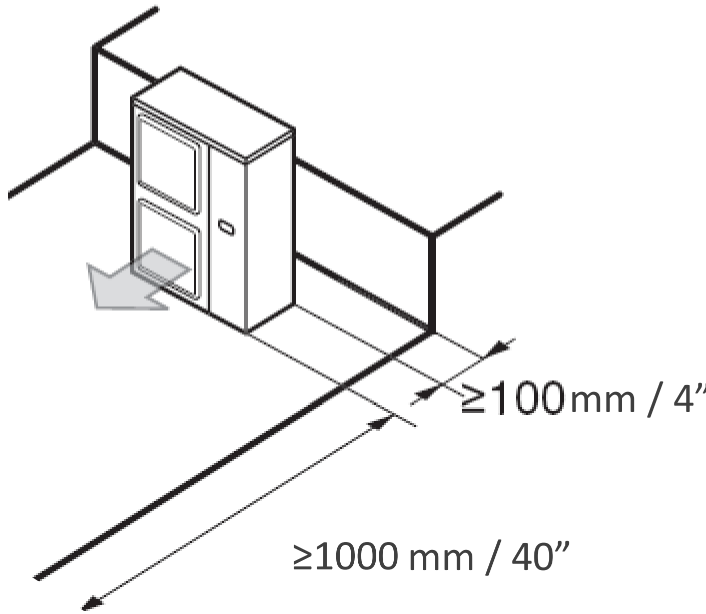
Clearance & Service Space – Condenser

ED(B)LQ036/48/54BAVJU



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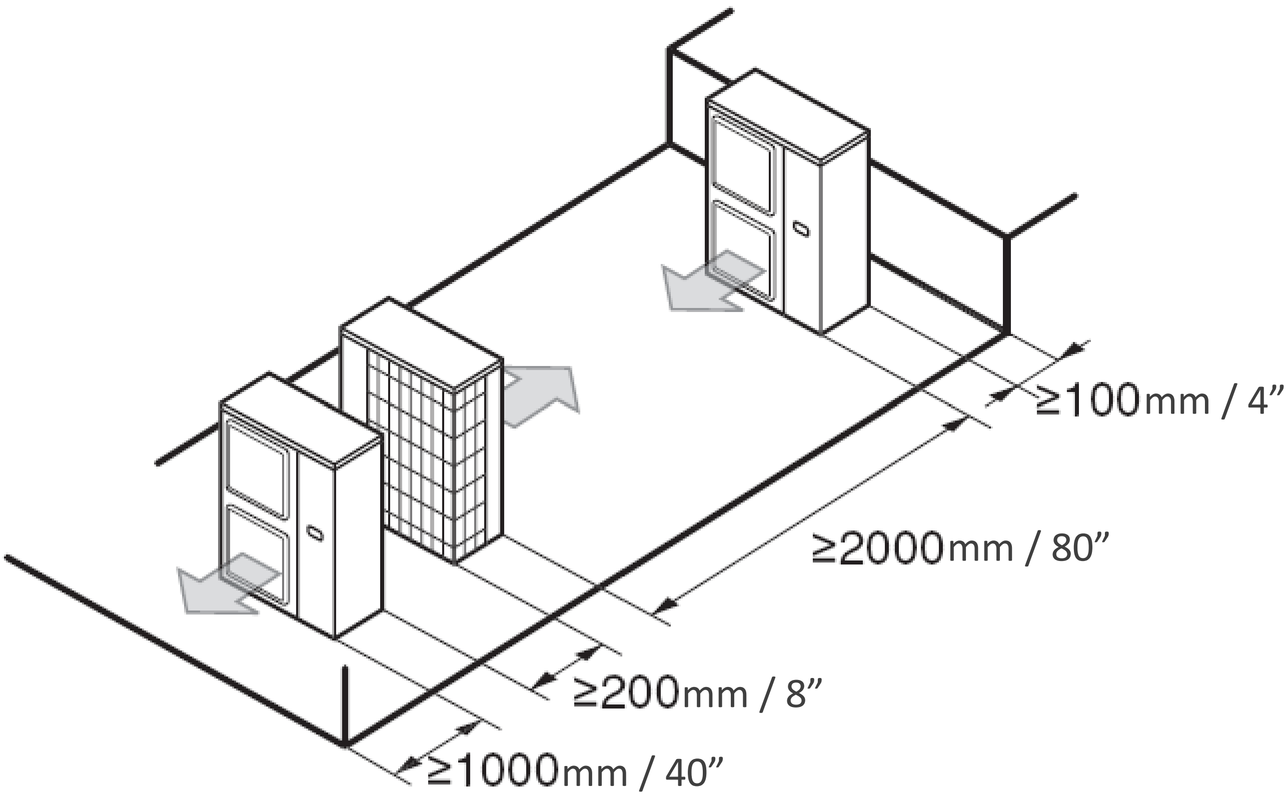
Clearance & Service Space – Condenser (cont.)

ED(B)LQ036/48/54BAVJU



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Clearance & Service Space – Condenser (cont.)

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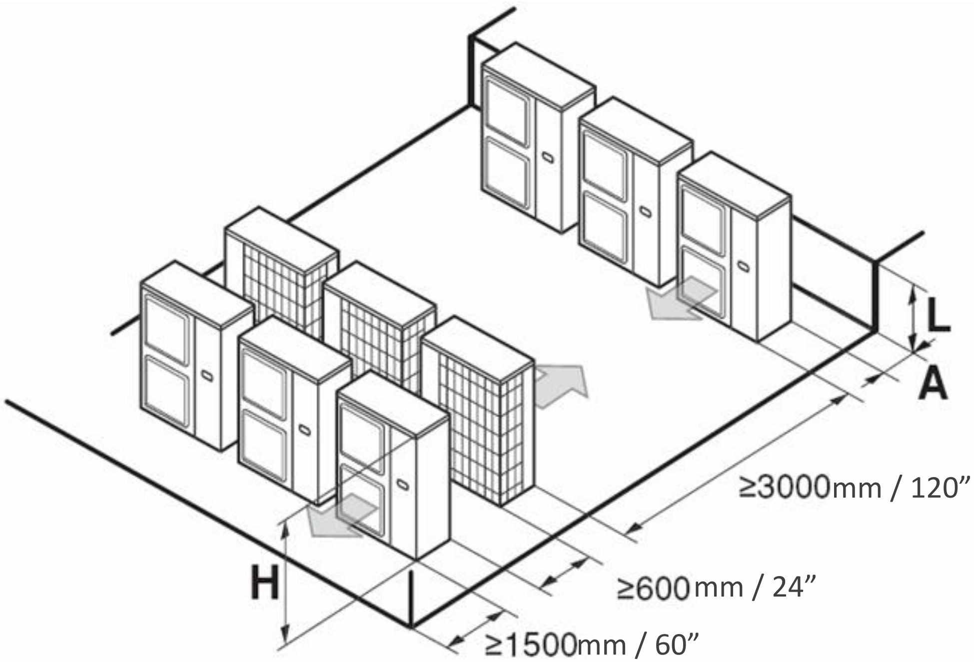
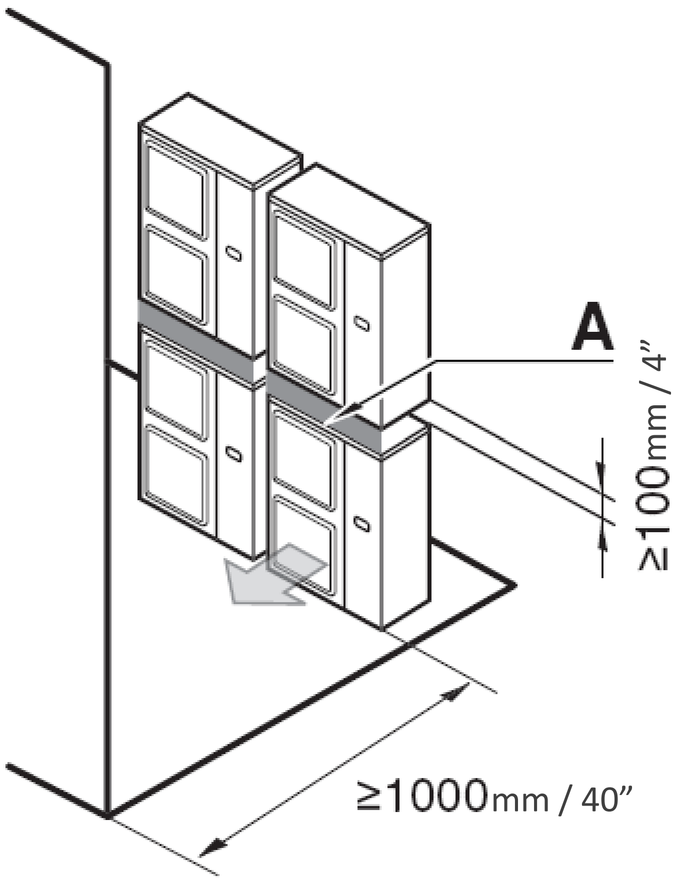
ED(B)LQ036/48/54BAVJU



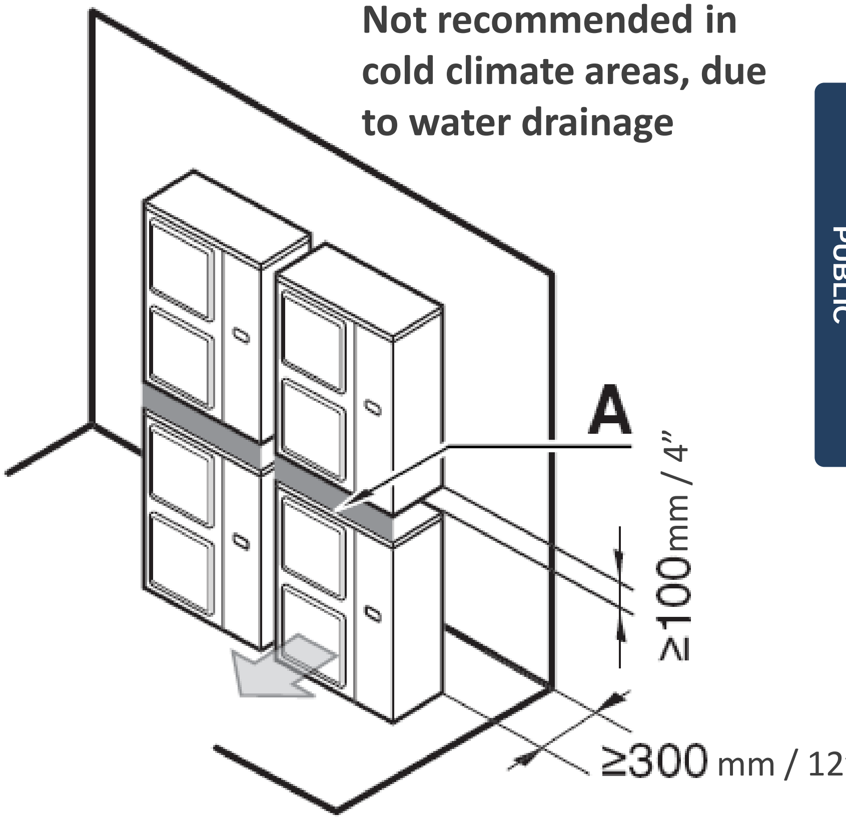
	L	A
L≤H	0<L≤1/2H	250 mm / 10"
	1/2H<L	300 mm / 12"
H<L	Installation impossible	

Clearance & Service Space – Condenser (cont.)

ED(B)LQ036/48/54BAVJU



Not recommended in cold climate areas, due to water drainage



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Internal Component Layout

ED(B)LQ036/48/54BAVJU

Control Box

Compressor Compartment

Hydronic Compartment

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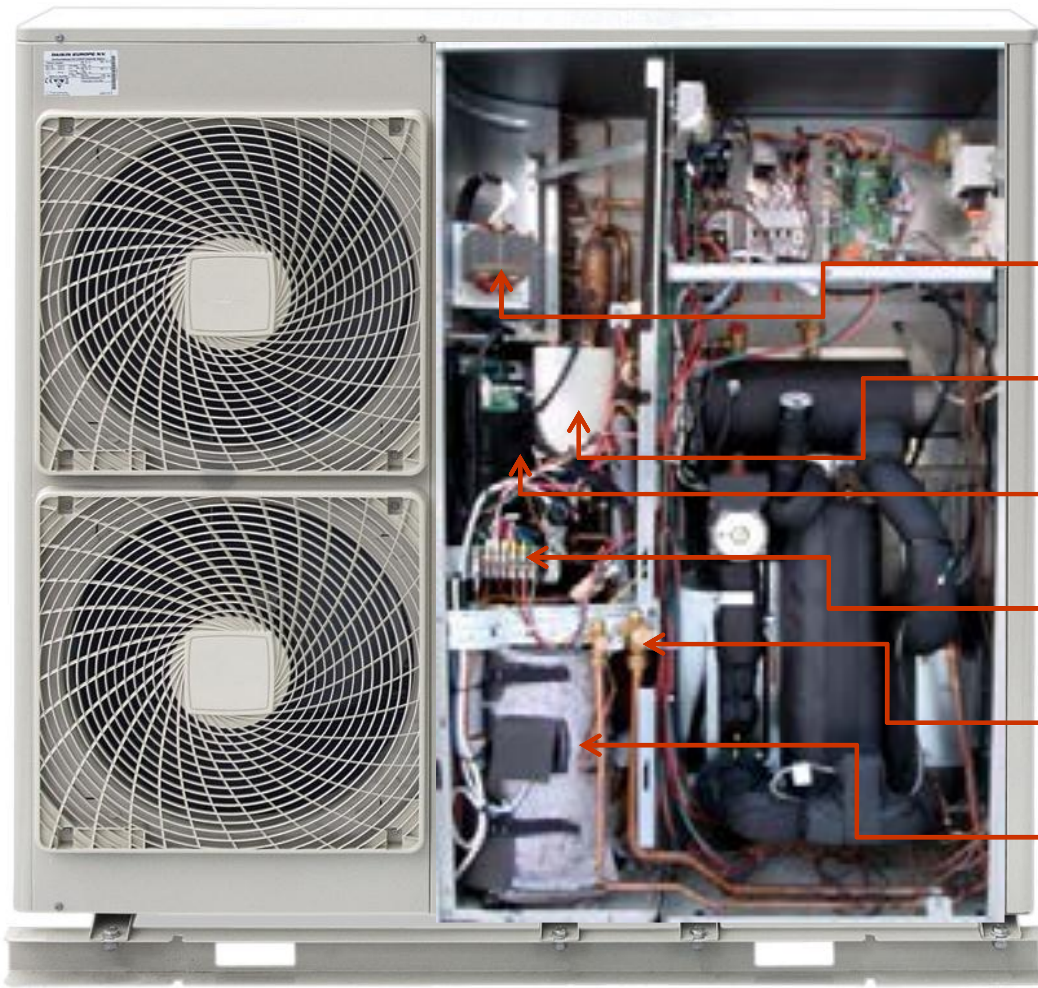
Internal Component Layout (cont.)

ED(B)LQ036/48/54BAVJU Compressor Compartment



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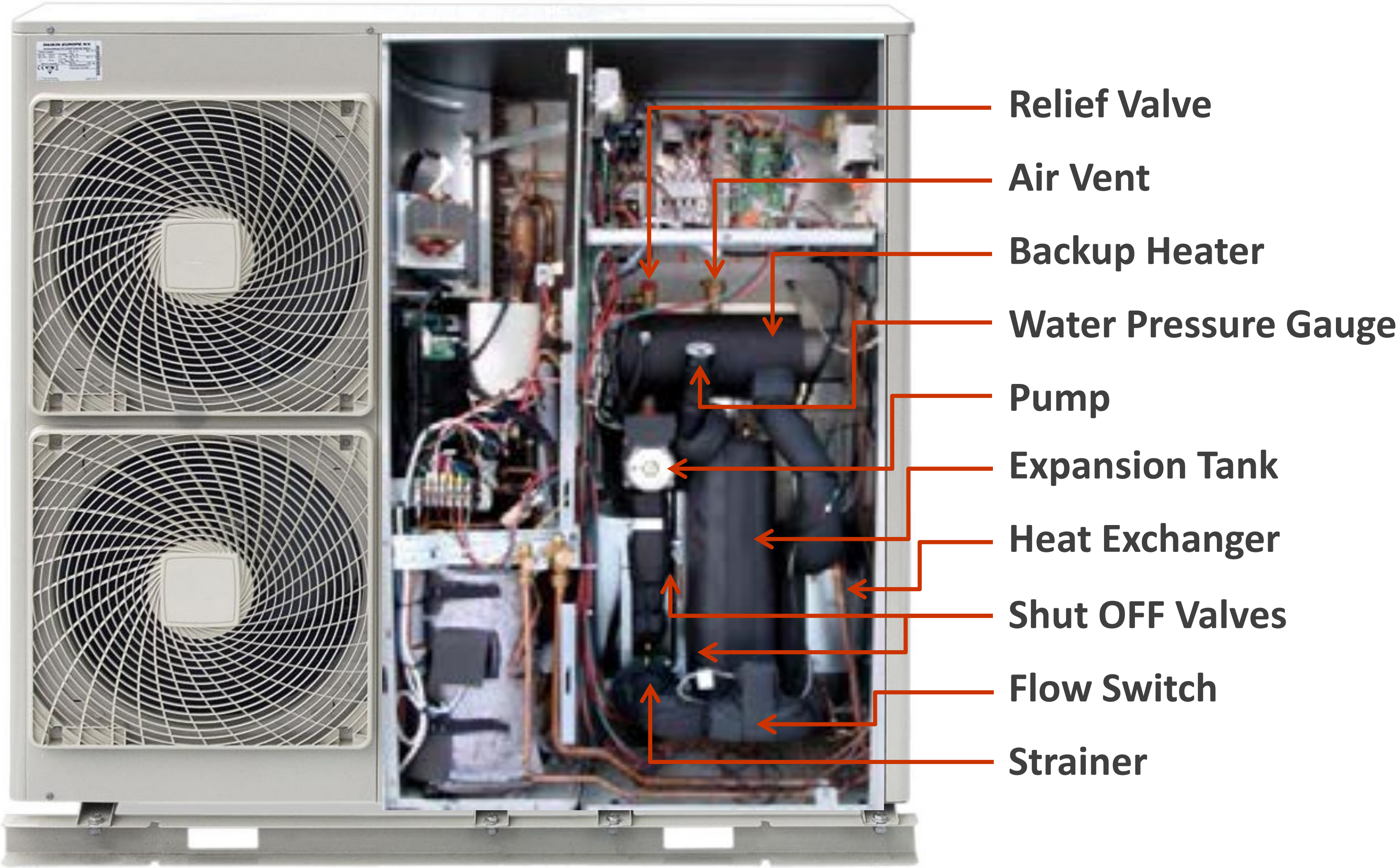
Internal Component Layout (cont.)

ED(B)LQ036/48/54BAVJU Hydronic Compartment



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Internal Component Layout (cont.)

ED(B)LQ036/48/54BAVJU Control Box

K5M – Main Backup Heater Relay

TR2 – Transformer For Relays & Valves

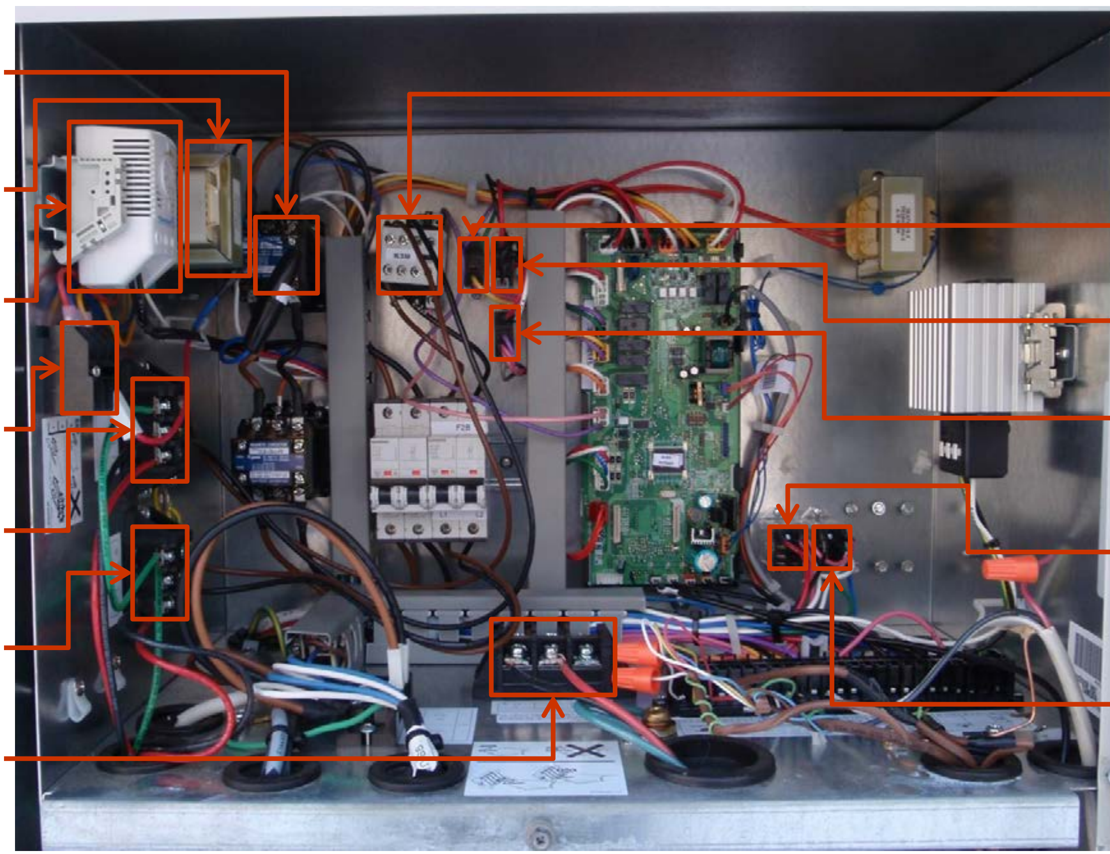
S1T – Stat Control Box Heater

X8M – Power Input Selector

X4M – Power OUT DHW Option

X3M – Power IN DHW Option

X10M – Power IN Backup Heater



K3M – Booster Heater Relay DHW Option

K1A – 3-way Valve Relay

K4M – Pump Relay

K2A – 2-way Valve Relay

K3A – Heating/Second Set Point Relay

K4A – Cooling/Second Set Point Relay

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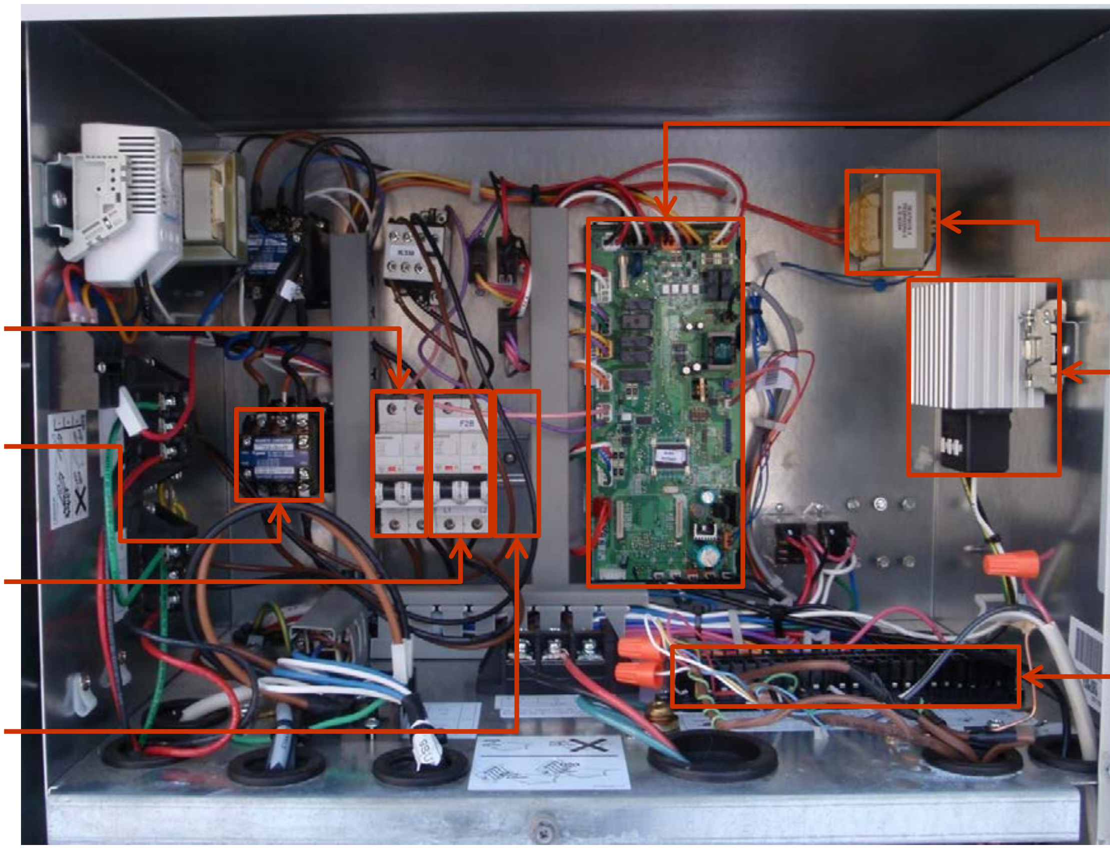
Note: Due to DHW breaker being field installed, service tech should always confirm power off with meter before servicing.

Internal Component Layout (cont.)

ED(B)LQ036/48/54BAVJU Control Box (cont.)



Note: Due to DHW breaker being field installed, service tech should always confirm power off with meter before servicing.

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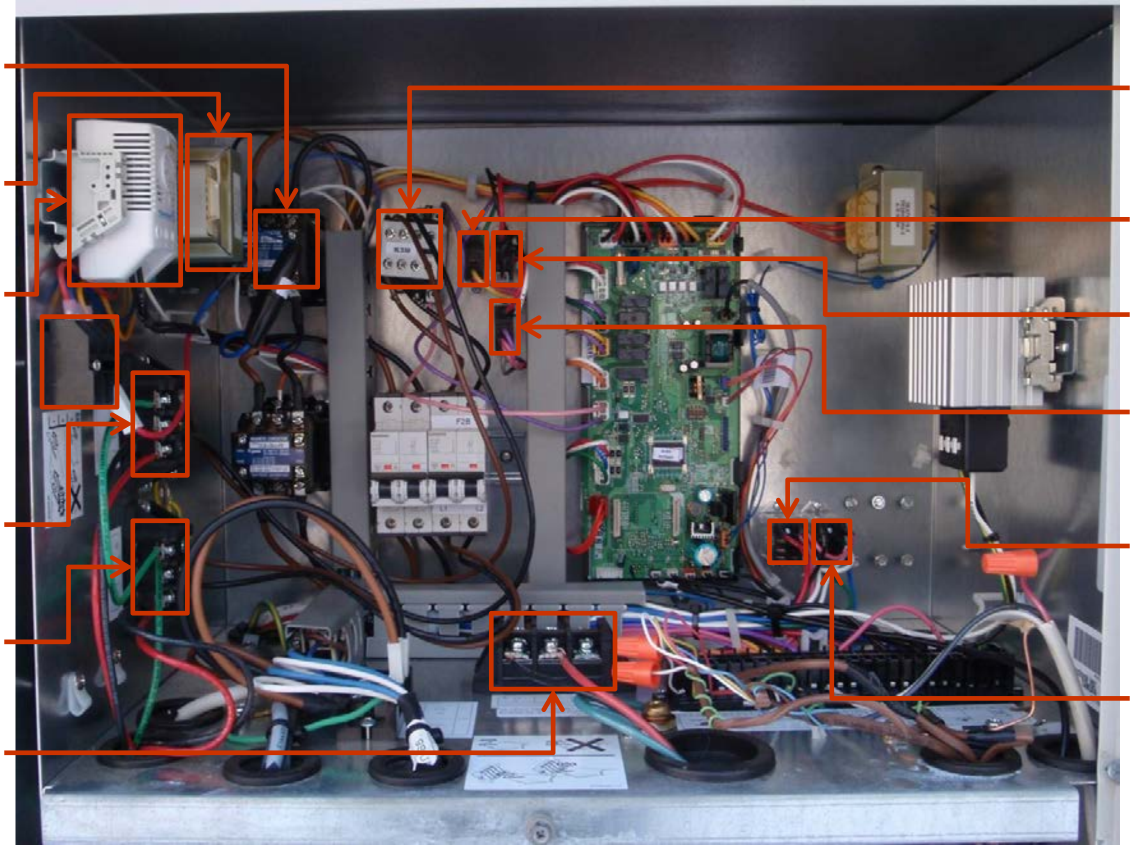
Internal Component Layout (cont.)

ED(B)LQ036/48/54BAVJU Control Box (cont.)



K5M – Main Backup Heater Relay

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S1T – Stat Control Box Heater

X8M – Power Input Selector

X4M – Power OUT DHW Option

X3M – Power IN DHW Option

X10M – Power IN Backup Heater

K3M – Booster Heater Relay DHW Option

K1A – 3-way Valve Relay

K4M – Pump Relay

K2A – 2-way Valve Relay

K3A – Heating/Second Set Point Relay

K4A – Cooling/Second Set Point Relay

Note: Due to DHW breaker being field installed, service tech should always confirm power off with meter before servicing.

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Cold Climate Considerations

Drain (outdoor unit)

If drain holes of the outdoor unit are covered by a mounting base or by floor surface, it is recommended to raise the unit in order to provide a minimum free space of 4 inch (100 mm) or more under the outdoor unit.

- ED(B)LQ036/048/054BA6VJU
  - 397 lbs. (180 kg.)

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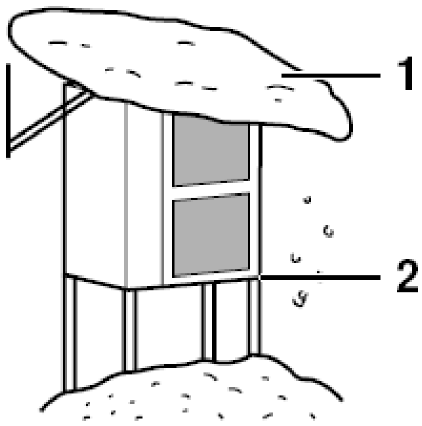
Cold Climate Considerations (cont.)

Heavy Snowfall Areas

In heavy snowfall areas it is very important to select an installation site where the snow will not affect the unit. If lateral snowfall is possible, make sure that the heat exchanger coil is not affected by the snow (if necessary construct a lateral canopy).



1 - Construct a large canopy.

2 - Construct a pedestal. Install the unit high enough off the ground to prevent burying in snow.

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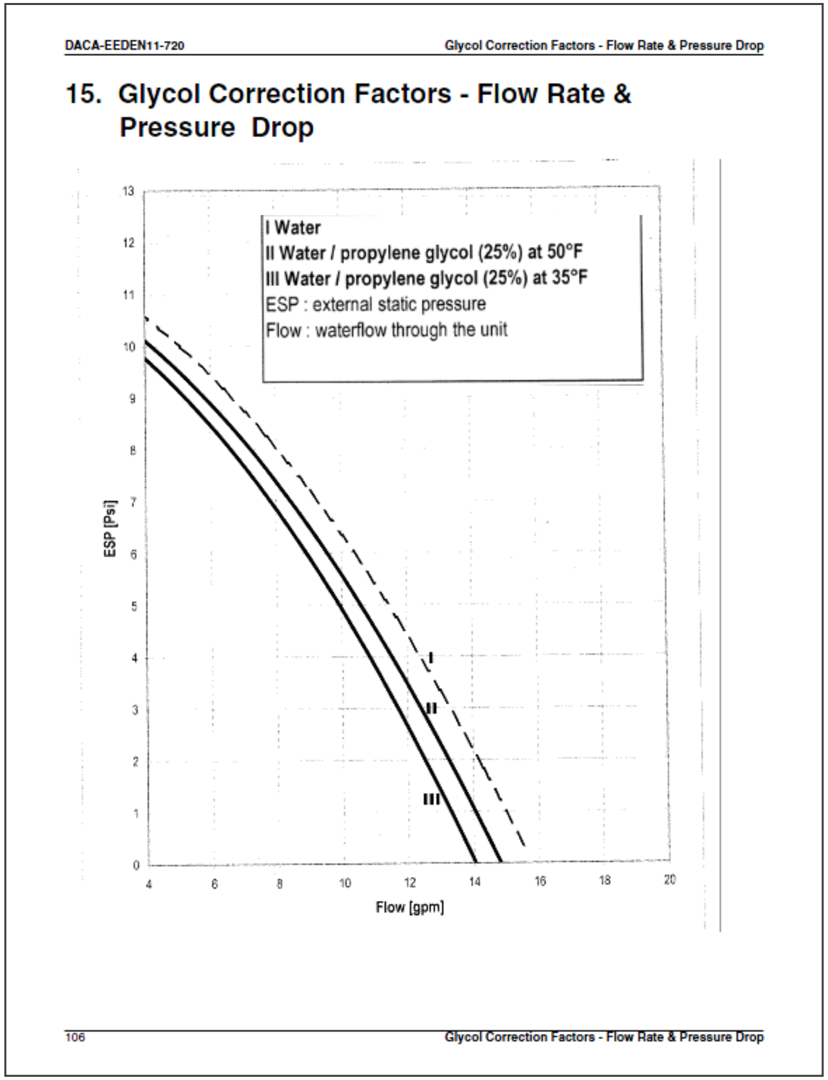
Cold Climate Considerations (cont.)

- **Glycol is recommended when ever water piping is located in areas that can drop below freezing or when installed in a location with frequent and long power outages (exceeding 2hrs.)**
- **When Glycol is used flow can be affected depending the percentage of concentration and outdoor temperature.**
- **The chart on the right shows the affects of 25% Glycol mixture.**
- **Only propylene type with a corrosive inhibitor should be used.**



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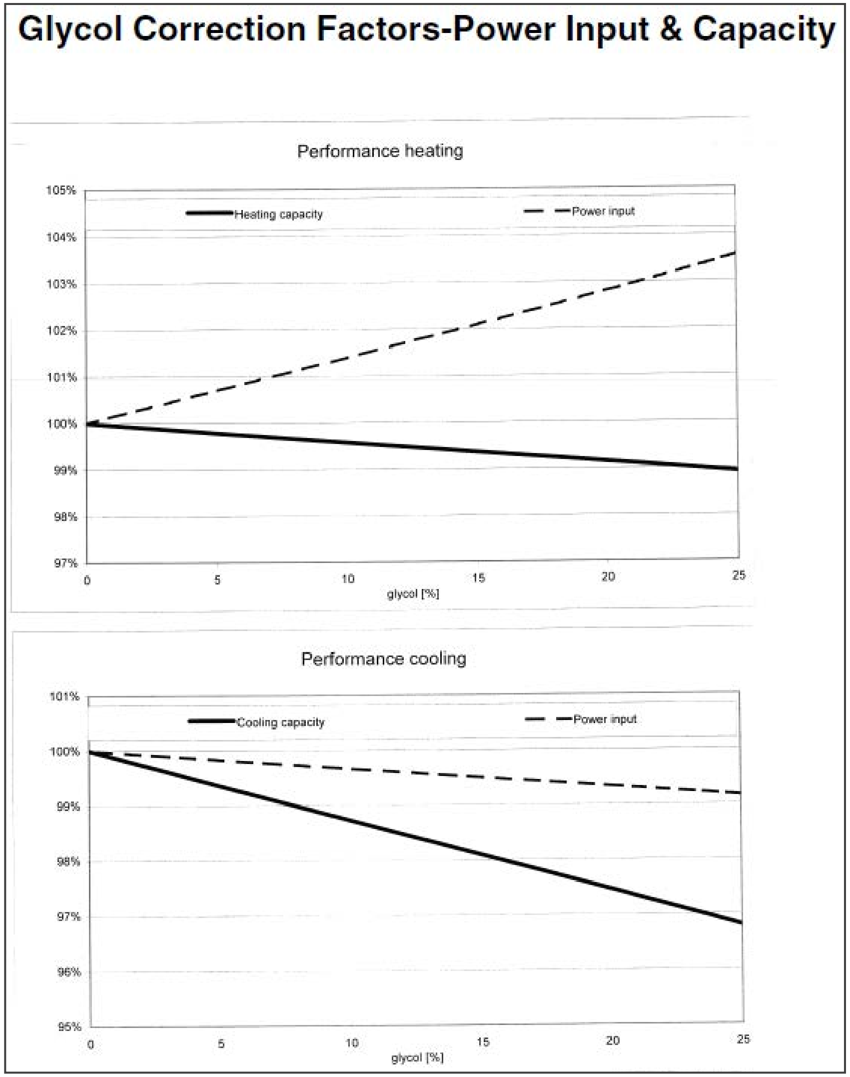
Cold Climate Considerations (cont.)

- Glycol will affect the power input and capacity slightly.
- The charts at the right shows the effect on Heating and Cooling



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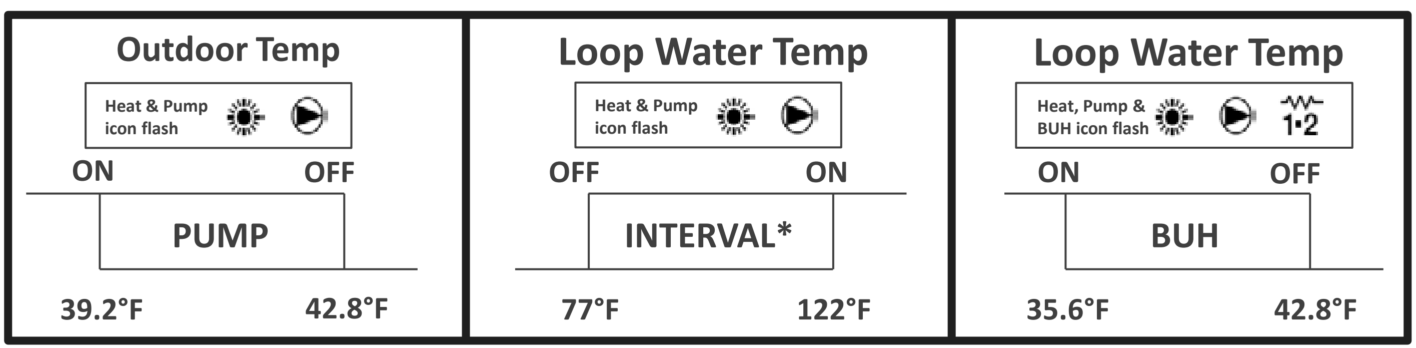
Automatic Cold Climate Freeze Prevention

- The Daikin Altherma MonoBloc has built in freeze protection. If the outdoor air temperature drops below 39.2°F the internal water pump will operate.
- If at the same time the loop water temp drops below 35.6°F the Altherma's backup heater will cycle ON & OFF as needed.
- In casses where the outdoor temperature is low but the loop water temperature is high the pump will cycle ON and OFF as needed (Interval).
- If the MonoBloc has a call for Heating, Cool or DHW mode, the syetm will automaticly turn OFF freeze protection.
- If the below air or water ON temperatures occur, the pump and BUH will operate until their OFF temperature is reached. When these actions are active the interface flash the following icons:



* Interval or continuous pump operation related to water temp, (Interval: 5 min. ON – 5 min. OFF).

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Refrigerant Statement

MonoBloc Systems
Model Numbers EBLQ__BA6VJU, EDLQ__BA6VJU:

The MonoBloc system is supplied to the installing contractor with the "refrigerant circuit" already complete and sealed to ensure optimum performance and operation in all modes of operation and as such NO additional field manipulation is required, expected or anticipated during the installation as it relates to the R-410A refrigeration cycle. The contractor is only required to make electrical and hydronic water connections to the MonoBloc condensing unit.

For more information see Daikin Altherma Refrigerant Statement (Nov. 2010).

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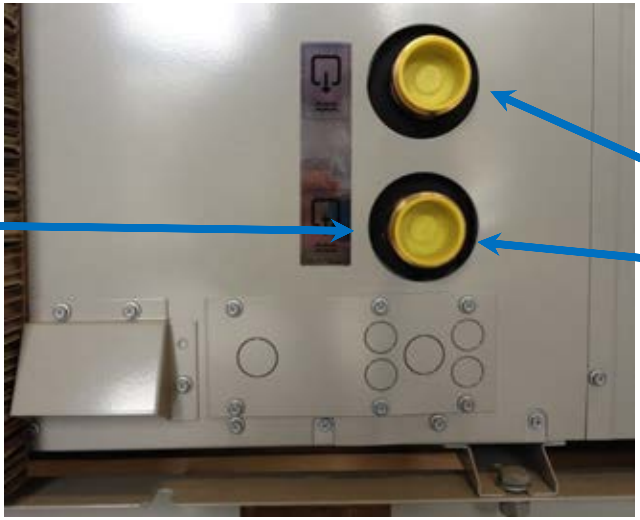
Attention Points on Water Circuit

- Altherma uses standard methods for hydronic system design
  - Installation of drain valves at the lowest places
  - Air vents at the highest level
  - All field piping must withstand the operating water pressure
  - Water quality must be according to “Safe Drinking Water Act (42 U.S.C 300f)”.
- Factory installed shut-off valves are located in hydronic section of MonoBloc
- BSP to NPT adapters available from Daikin AC

Be sure to remove plastic plugs before installation



Rear of MonoBloc
1¼” Female BSPT

Water OUT

Water IN

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Attention Points on Water Circuit (cont.)

- All Daikin supplied parts and equipment water connections are BSP, not NPT
  - BSP/NPT fitting kits are available from Daikin
- BSP and NPT are not the same thread, 55° verse 60°, angled peaks/valleys verse rounded and more
- Daikin does not support the use of mixing BSP & NPT threads
- Consult Sales Bulletin RSS-001 for more details

Application	Part Number	List Price	Note
Hydrobox / Hydro-section	DACA-HBA-1	$ 40.00	2 fittings included, Bagged and Labeled
	DACA-HBA-2	$ 30.00	2 fittings included, Bagged and Labeled
	DACA-HBA-3	$ 42.00	2 fittings included, Bagged and Labeled
3-Way Valve (DHW)	DACA-3WVTA-1	$ 20.00	1 fitting included, Bagged and Labeled Refer to summary diagram for Qty
	DACA-3WVTH-1	$ 15.00	1 fitting included, Bagged and Labeled Refer to summary diagram for Qty
DHW Tank / Solar Kit	DACA-THXA-1	$ 28.00	2 fittings included, Bagged and Labeled
	DACA-DHWTA-1	$ 22.00	2 fittings included, Bagged and Labeled
Replacement	DACA-MP-1	$ 10.00	Only needed if Re-circ or Anode is removed
Recirculation	DACA-DHWRA-1	$ 9.00	Only needed if Re-circ connection is being utilized

Notes: 1. Normal customer multipliers apply for net pricing
2. List pricing is effective June 1, 2011

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Attention Points on Water Circuit (cont.)

Minimum Water Volume

MonoBloc ED(B)LQ036/048/054BA6VJU

Minimum water volume

- **Heating only model: 5.28 gal / 20 liter**
- **Heating / Cooling model: 5.28 gal / 20 liter**

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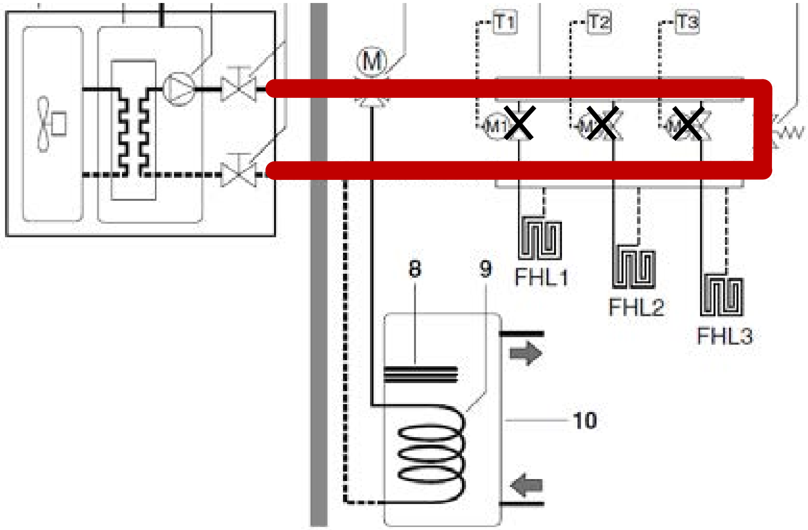
Attention Points on Water Circuit (cont.)

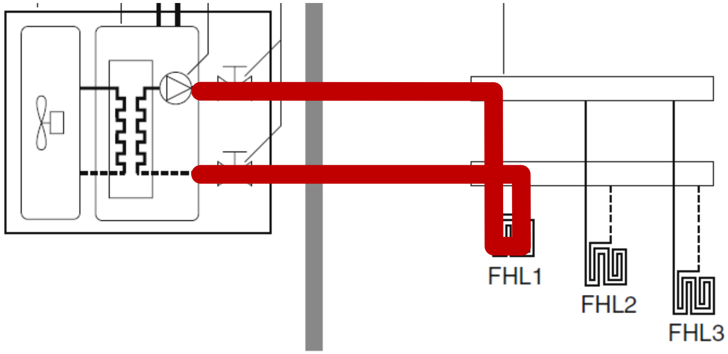
!!! Caution !!!

The minimum water volume of the system is the available water volume in the most critical situation

The most critical situation in this type of installation is in case when all valves are closed. Available water volume is only main piping loop.

This application requires each zone on its own needs to meet the minimum water volume.





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Attention Points on Water Circuit (cont.)

Setting Expansion Vessel

- Factory pre-pressure for the expansion vessel is 14.5 PSI (1 bar), keep in mind the following guidelines:
  - Use dry nitrogen to set the expansion vessel pre-pressure
  - Inappropriate setting of the expansion vessel pre-pressure can lead to malfunction of the system
  - Charging point to adjust the pressure inside the expansion vessel.
  - Water volume expansion vessel: 2.642 gal / 10 liter

Follow the installation instructions on how to adjust pressure of tank if the application requires adjustment.

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Attention Points on Water Circuit (cont.)

Setting Expansion Vessel

How to set internal expansion tank

- Measure each size pipe and use correct chart to find distribution systems internal volume.
- Fan coil units, radiant zones and any other emitters should be included in calculations.
- Internal volume of Altherma equipment should be included too, see equipment specs.

Type M Copper Internal Volume	
¾”	37’ = 1 gal (0.0269 gal per ft)
1”	22’ = 1 gal (0.0454 gal per ft)
1 ¼”	15’ = 1 gal (0.0681 per ft)
1 ½”	11’ = 1 gal (0.0951 per ft)
2”	6’ = 1 gal (0.165 per ft)

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Attention Points on Water Circuit (cont.)

Setting Expansion Vessel

- Using the table to the right determine if any action will be needed.
- If the pressure needs to be adjusted
- The pre-pressure (Pg) to be set depends on the maximum installation height difference (H) and is calculated as below: Pg (PSI)=(H÷32+0.3) X 14.5

Installation height difference[a]	Water volume ≤74 gallons (280 l)	Water volume >74 gallons (280 l)
≤23 ft (≤7 m)	No pre-pressure adjustment required.	Actions required: • pre-pressure must be decreased, calculate according to "Calculating the pre-pressure of the expansion vessel" • check if the water volume is lower than maximum allowed water volume (use graph below)
>23 ft (>7 m)	Actions required: • pre-pressure must be increased, calculate according to "Calculating the pre-pressure of the expansion vessel" • check if the water volume is lower than maximum allowed water volume (use graph below)	Expansion vessel of the unit too small for the installation.

(a) Installation height difference: height difference (ft)(m) between the highest point of the water circuit and the unit. If the unit is located at the highest point of the installation, the installation height is considered 0 ft (0 m).

Example 1:

- Install is 16.4’ of height separation and the volume is 26.4 gal.
- No action required

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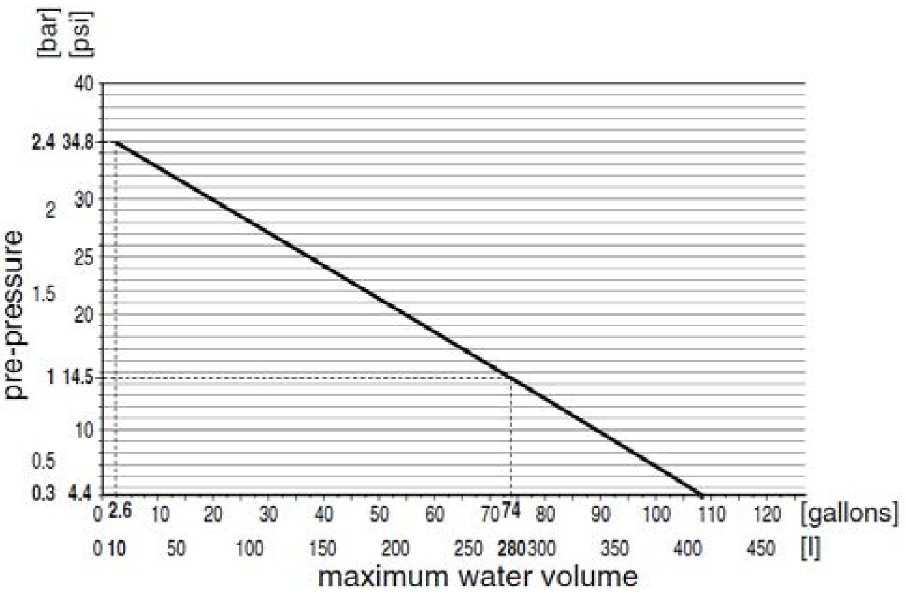
Attention Points on Water Circuit (cont.)

Setting Expansion Vessel

- **Determine water volume of system**

Example 2:

- **Hydronic section installed at highest point in water circuit. The total water volume is 92.5 gal. Height = 0.**
- **(0÷32+0.3) x 14.5 = 4.4 PSI**
- **4.4 PSI will allow for 108 gal of water, on board tank will suffice adjust tank to 4.4 PSI.**



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Possible Wiring Configurations

1. The Altherma can be configured in many different ways, here are the different options:
2. Space Heating Only
3. Space Heating & DHW Production
4. Space Heating & DHW Production with Solar
5. Space Heating & Space Cooling
6. Space Heating, Space Cooling & DHW Production
7. Space Heating, Space Cooling & DHW Production with Solar
8. Space Cooling Only
9. Space Cooling, DHW Production
10. Space Cooling, DHW Production with Solar
11. DHW Production
12. DHW Production with Solar

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Field Wiring – MonoBloc

Electrical Connections

1	Knock out hole for unit power supply cable entry	**3**	Cap for low voltage cables entry (<30 V)
2	Knock out hole for backup heater power supply cable entry	**4**	Knock out holes for other power cables entry

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* **Electrical work is to comply with ALL local electrical codes**

Control Box Field Wiring – X2M Terminal Block

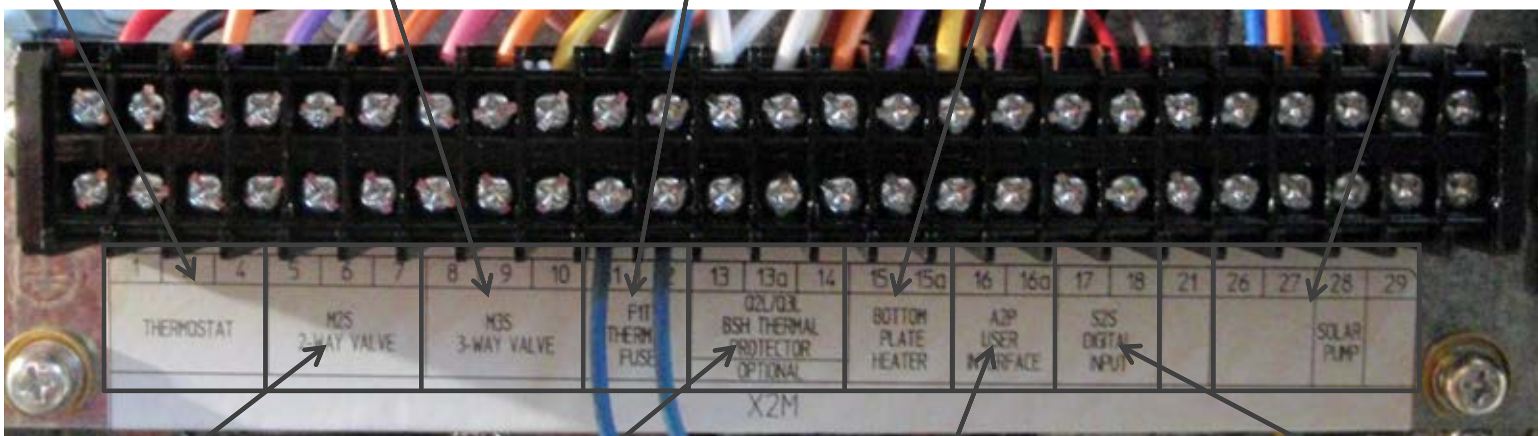
Thermostat
1, 4 Heating – 24VAC
2, 4 Cooling – 24VAC

3-way Valve
24 VAC 100mA max.
8, 9 Heating – 24VAC
9, 10 DHW – 24VAC

Thermal Fuse
11, 12 –
208/240VAC

Bottom Plate Heater
15, 15a – 208/240VAC

21 – EKRP1HB
26, 27 – 24VAC & EKRP1HB
28 – EKRP1HB
29 – Not used



2-way Valve (Cooling)
24 VAC 100mA max.
5, 7 Normally Closed – 24VAC
6, 7 Normally Open – 24VAC

DHW Tank Q3L Safety
13, 14 – 208/240VAC

13a – Solar Pump
208/240VAC

User Interface Connection
16, 16a – 15VDC
Do not connect any other control to these connections

Digital Input – Time of Use Utility Rate (Benefit kWh)
17, 18 – voltage free contacts

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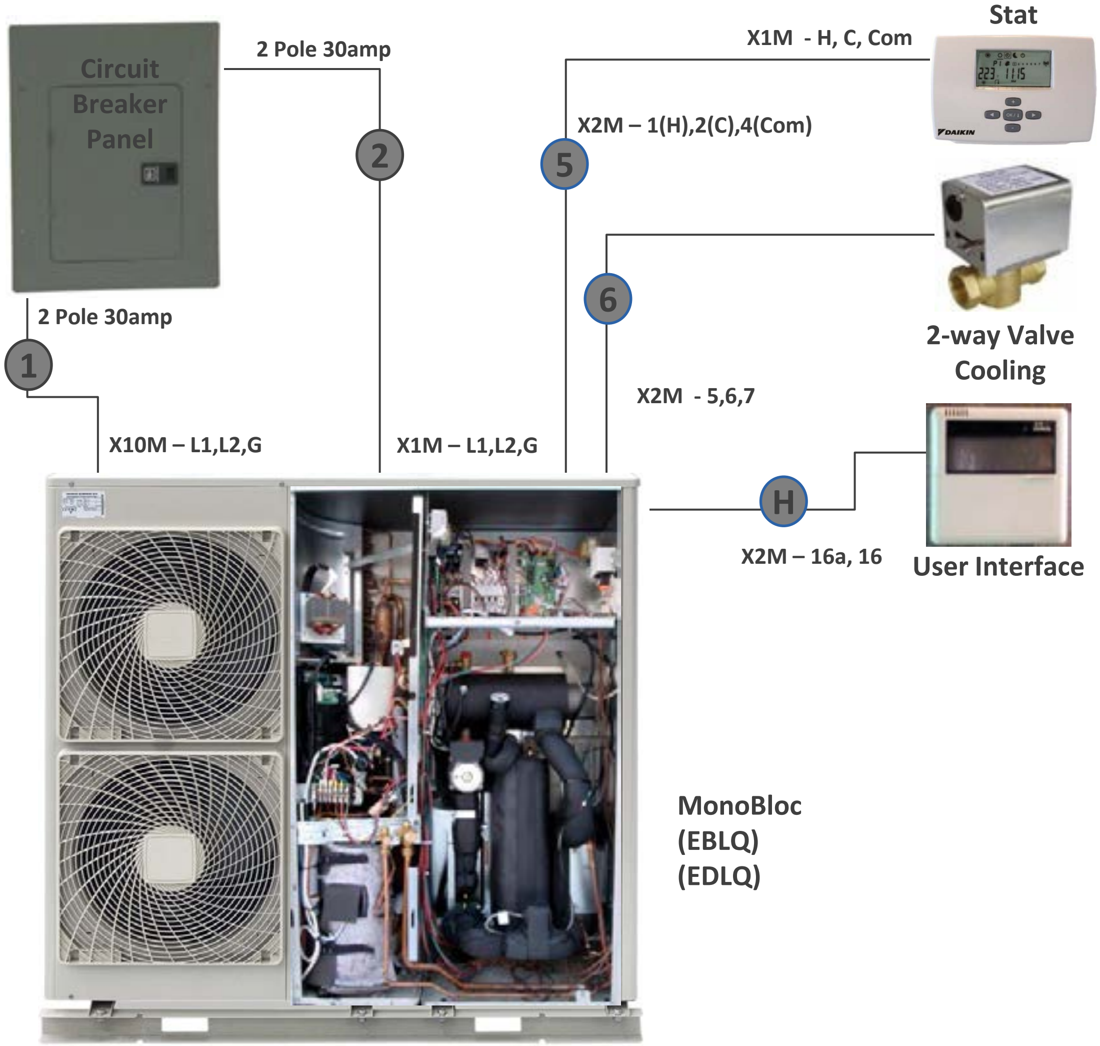
* Electrical work is to comply with ALL local electrical codes

Field Wiring EDLQ/EBLQ MonoBloc Altherma



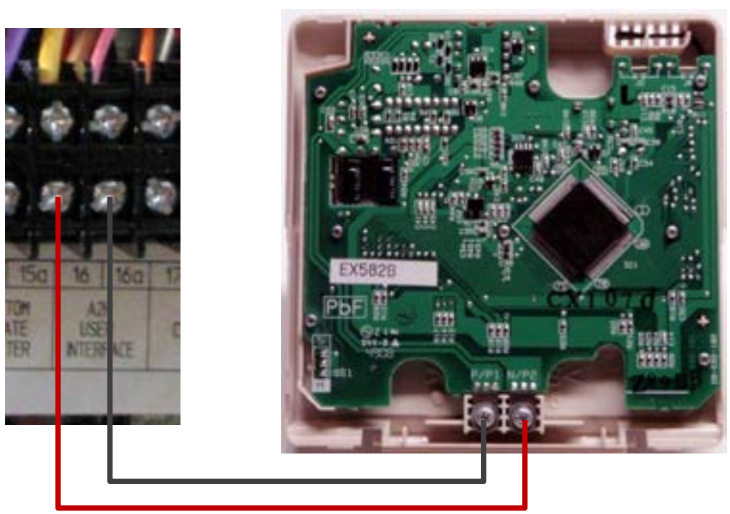
Typical Wire & Breaker Sizes*			
	Wire #	**Qty - Gauge**	**Note:**
Heating	1	3 - #10	30amp 2 Pole
	2	3 - #10	30amp 2 Pole
	5	2 - #18 min.	- - -
Cooling	6	Optional – 24VAC Circuit 100mA max. refer to 3rd party valve spec	
MonoBloc	H	2 - #18 (non-shielded stranded copper)	- - -

* Electrical work is to comply with ALL local electrical codes

Low Voltage Wiring – Installation of Remote Controller

Installing the User Interface.

- Find User Interface, it is packed in a box inside the MonoBloc unit.
- Remove back plate from controller using small flat screwdriver and mount controller in the desired location.
- Install wire from the MonoBloc's control box (X2M-16,16a) to back of User Interface (P1,P2).
- These wire <u>should not have a junction in them</u>, run wires point to point.
- Use 16 or 18 gauge wire, non-shielded, stranded copper wire.
- Maximum length can be 1,640 feet.

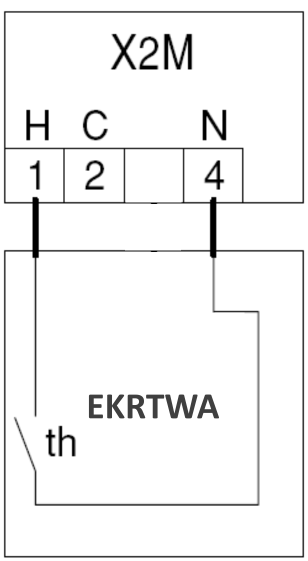


Low Voltage Wiring – Thermostat

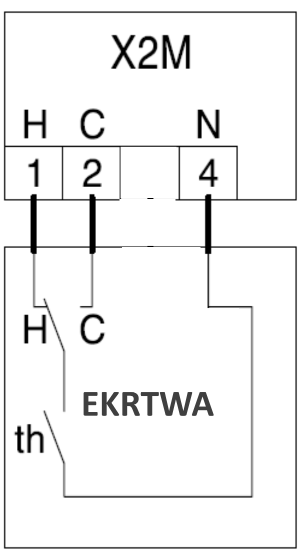
Connection of a Daikin thermostat

- The Daikin thermostat is for Radiant applications only, no fan operation available
- When installing a EFWT fan coil, it is recommended to use a third party thermostat that can control fan operation on hydronic applications

Heating only



Heating/Cooling



EKRTW

NOTE:
24VAC is present between terminals 1 & 4 and 2 & 4

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* <u>Electrical work is to comply with ALL local electrical codes</u>

Low Voltage Wiring – Thermostat

Connection of the third party thermostat/control

Heating only

X2M		
Heating		Com
1		4

Heating/Cooling

X2M		
Heating	Cooling	Com
1	2	4

NOTE:
24VAC is present between terminals 1 & 4 and 2 & 4

- Third party controls can be used on Daikin Altherma
- Dry contacts only (voltage free)
- Be careful when opposing control voltages are present
- Isolation relays may be needed depending on application

Simultaneous Call

It is important when wiring multiple zones that precautions are taken so that a simultaneous call for Heat & Cool cannot occur. In the event that a simultaneous call does occur for Heat & Cool, the unit will stop operating until one of the calls is removed. DHW mode will still operate normally during a simultaneous call.

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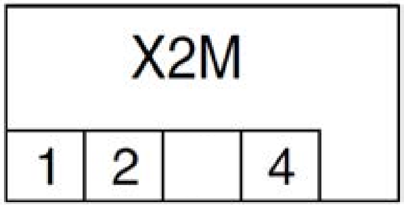
* Electrical work is to comply with ALL local electrical codes

Low Voltage Wiring – No Thermostat

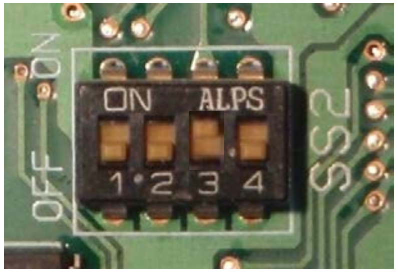
When no thermostat is connected to the indoor unit, pump operation will be determined by the leaving water temperature.

The operation of the Altherma will be controlled by the User Interface

No wiring is needed



Leave DIP switch 3 OFF



DIP Switches on Main PCB

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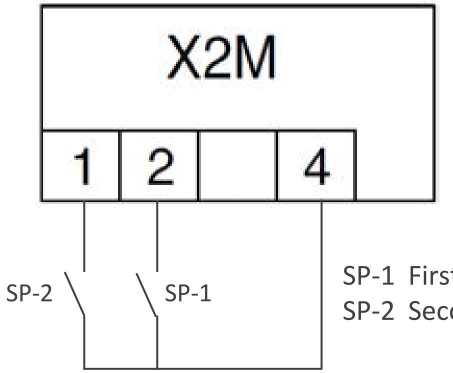
Low Voltage Wiring – Wiring Dual Set-point

- **Second set point heating should be linked to the heat emitters which requires the highest set point in heating mode.**
- **Second set point cooling should be linked to the heat emitters which requires the lowest set point in cooling mode.**
- **NOTE: When dual set point is enabled, heating/cooling change over must be done manually at user interface.**



SP-1 First set point contact
SP-2 Second set point contact

Set Field Settings for Dual Set-point operation: 7-02, 7-03, 7-04.
(See Installation Manual of the Hydro-box for more information)

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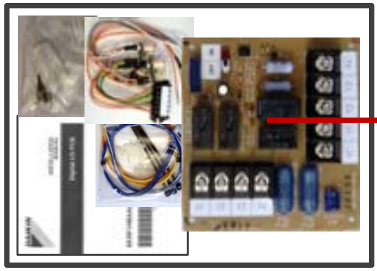
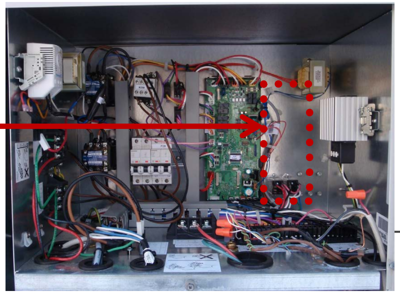
Altherma Co-valent Wiring for ERKP1HBAAU adapter

This Co-valent scenario uses the Heating & Cooling ON/OFF outputs of the EKRP1HB Digital I/O PCB Kit – X7M 3, 4

MonoBloc Control Box





EKRP1HBAAU comes with
A4P PCB
K5A, K6A, K7A relays
X7M terminal block
Screws and installation diagrams

In Co-valent applications the field supplied heat source takes the place of the internal backup heater.

Altherma & the second heat source are piped in series so the internal water pump of the Altherma can be utilized to move water through the other heat source.

It is important that the entering water temp to the Altherma is lower than 149°F/65°C, if higher an error and shut down will result.

Field Setting [4-00] = 0 – Disables backup heater

The field supplied outdoor stat should be set to the temperature at which additional heat is needed to maintain the load. Also the stat will need to be set to turn OFF the heat source at a higher outdoor ambient when no more heat is needed, example 60°F/15°C, this will stop the second heat source from running during cooling mode.

X7M – 3, 4

T775
Field Supplied Outdoor Stat

T & T Contacts

Field Supplied Heat Source

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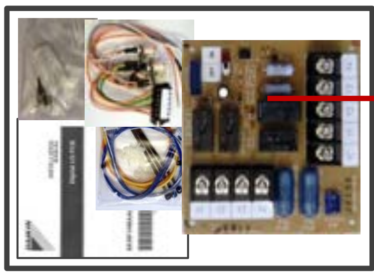
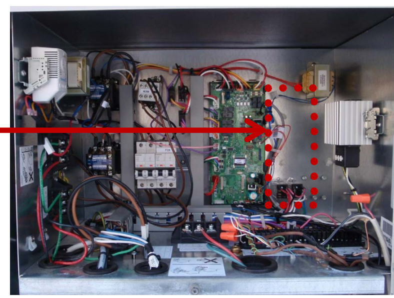
* Electrical work is to comply with ALL local electrical codes

Altherma Bi-valent Wiring for ERKP1HBAAU adapter

EKRP1HBAAU comes with
A4P PCB
K5A, K6A, K7A relays
X7M terminal block
Screws and installation diagrams





MonoBloc
Control Box

A4P – X1, X2

J

Typical Wire Sizes*			
	Wire #	Qty - Gauge	Notes:
Control wire	J	2 - #18	- - -

Set Field Settings for Bi-valent operation:
C-02, C-03, C-04.
(See Installation Manual for more information)

X1, X2 Terminals (dry contacts, no voltage present)
Maximum Load: 1A-24VAC
Minimum Load: 20mA-5VDC

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Field Supplied Heat Source

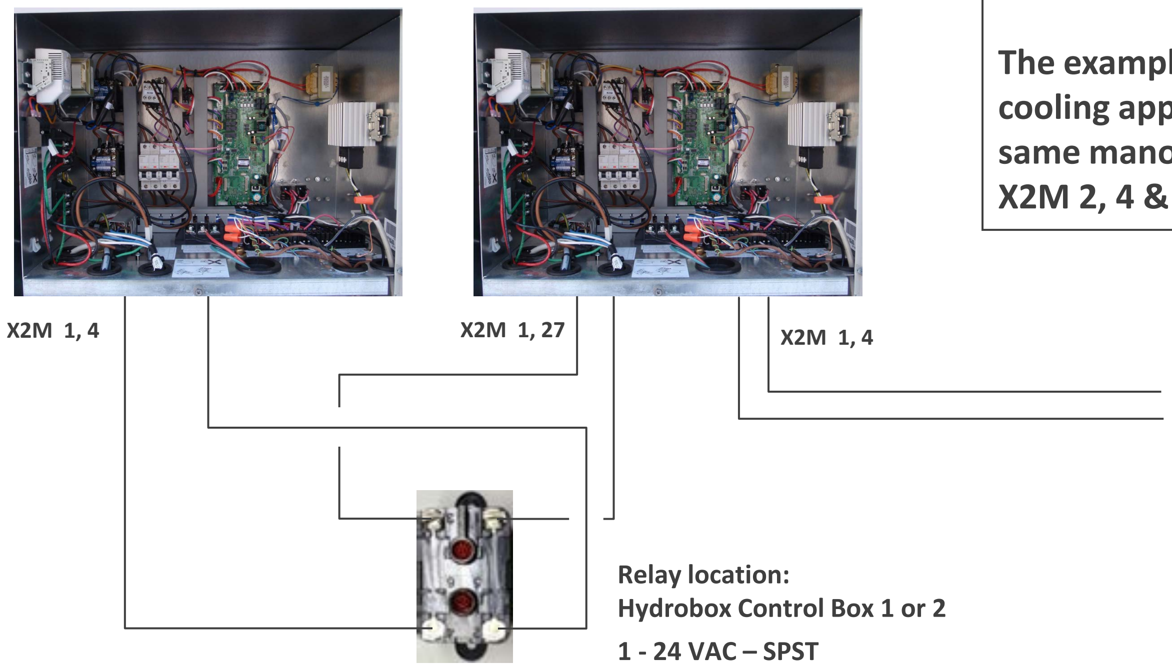
T & T Contacts

* Electrical work is to comply with ALL local electrical codes

Multi Daikin Altherma Wiring

There is 24 VAC present at each Altherma external control connection, when wiring Multiple units it is necessary to separate them with an isolation relay.

The example shown is for heating only, cooling applications can be done in the same manor using terminals;
X2M 2, 4 & 2, 27.



2-way Valve Installation

- On some installations a 2-way valve may be needed to isolate different heating/cooling emitters in the hydronic circuit
- A field supplied 24VAC valve **100mA max.**, either NO or NC can be wired to hydrobox terminals X2M – 5,6,7 see below
- 2-way should have a 60 second cycle time or less
- On a call for Cooling this valve will be energized to insure only chilled water is sent to the cooling emitters
- If a call for DHW occurs during the call for Cooling the valve will remained energized until the DHW call and Cooling call is satisfied

2-way Valve	hydrobox – X2M
Normally Closed	Terminals 5 & 7
Normally Open	Terminals 6 & 7

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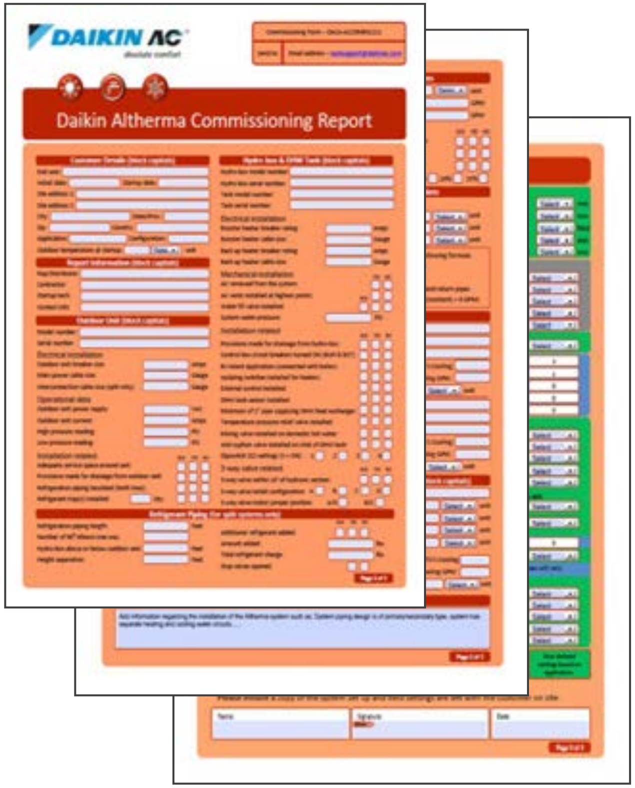
Next Steps

After installation is complete and the system is ready to be started. Startup techs can utilize the Commissioning Report and Quick Startup Guide to finish the job.



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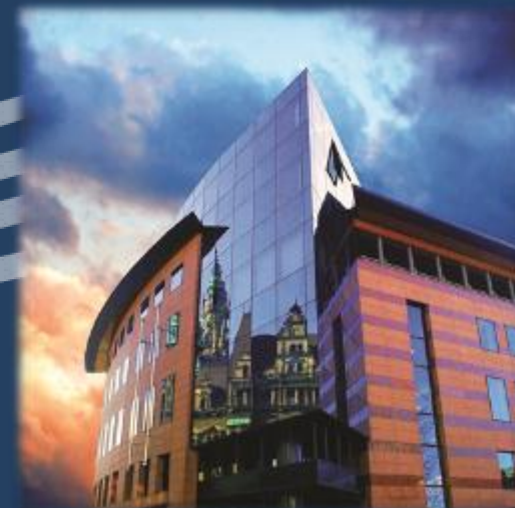
For more detailed information check Daikin's Engineering, Installation, Operation and Service manuals.
Available at www.daikinac.com

Thank You

Daikin Altherma™



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Domestic Hot Water Tank Installation

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Installation Topics

- System Component Model Numbers
- Domestic Hot Water (DHW) Tank Specifications
- Required and Optional BSP/NPT Kits
- What’s in the Box
- Installation Considerations
- Clearance & Service Space
- DHW Tank Piping
- Installation of 3-way valve
- Field Wiring
- Solar Kit
- DHW Kit
- Next Steps
- 3-way Valve Re-sync Procedure

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System Component Models Numbers

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Domestic Hot Water Tank

- 50 Gal. Tank – EKHWS050BAVJU
- 80 Gal. Tank – EKHWS080BAVJU

Option Component Model Numbers

- Solar Kit – EKSOLHWBAVJU
- Optional BSP Kits
  - Solar Kit
  - Recirculation Loop
- 3rd Party Tank Connection Kit – DACA-DHW-KIT-1
  - Optional Parts for DHW Kit
    - 3-way valve body – Part #5001837
    - 3-way valve motor head – Part #5002760

Altherma Domestic Hot Water (DHW) Tank Specifications

		EKHWS050BA3VJU	EKHWS080BA3VJU
			
Dimensions	Height	45 1/32 inch / 1143 mm	63 inch / 1600 mm
	Diameter	22 1/16 inch / 562 mm	
Weight Empty		99 lb / 45 kg	129.8 lb / 59 kg
Mounting		Floor	
Power Supply		1 ~ 230V (208V) / 60Hz	
DHW Set Point Range		86 ~ 173°F (30 ~ 78°C) *	
Booster Heater Capacity		3kW	
Water Volume		52.8 gal / 200 l	79.2 gal / 300 l
Connections		¾” FBSP (Female British Standard Pipe (Parallel))	

*** Heat Pump Max DHW Temp 113°F (45°C) to 122°F (50°C) depending on outdoor temperature**

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Required BSP Kits

- Small Split 018-030 with 50 or 80 gal. tank (includes hydrobox fittings)
- BSP Kits are ordered separately from equipment.

Model Number	Qty. Required	Description
DACA-HBA-2	1	2 fittings for hydrobox heating/cooling loop in and out – 1” female NPT connections
DACA-3WVTH-1	3	3 fittings for 3-way valve – 1” female NPT connections
DACA-THXA-1	1	2 fittings for supply loop to DHW heat exchanger – 1” female NPT connections
DACA-DHWTA-1	1	2 fittings for domestic cold and hot connections – ¾” female NPT connections

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Required BSP Kits (cont.)

- Large Split 036-054 with 50 or 80 gal. tank (includes hydrobox fittings)
- BSP Kits are ordered separately from equipment.

Model Number	Qty. Required	Description
DACA-HBA-1	1	2 fittings for hydrobox heating/cooling loop in and out – 1 ¼" female NPT connections
DACA-3WVTH-1	1	1 fittings for 3-way valve – 1" female NPT connection
DACA-3WVTA-1	2	2 fittings for 3-way valve – 1 ¼" female NPT connections
DACA-THXA-1	1	2 fittings for supply loop to DHW heat exchanger – 1" female NPT connections
DACA-DHWTA-1	1	2 fittings for domestic cold and hot connections – ¾" female NPT connections

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Required BSP Kits (cont.)

- **MonoBloc 036-054 with 50 or 80 gal. tank (includes monobloc fittings)**
- **BSP Kits are ordered separately from equipment.**

Model Number	Qty. Required	Description
DACA-HBA-3	1	2 fittings for monobloc heating/cooling loop in and out – 1 ¼" male NPT connections
DACA-3WVTH-1	1	1 fittings for 3-way valve – 1" female NPT connection
DACA-3WVTA-1	2	2 fittings for 3-way valve – 1 ¼" female NPT connections
DACA-THXA-1	1	2 fittings for supply loop to DHW heat exchanger – 1" female NPT connections
DACA-DHWTA-1	1	2 fittings for domestic cold and hot connections – ¾" female NPT connections

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Optional BSP Kits

- Optional Solar Kit (EKSOLHWBAVJU) BSP Kits

Solar Line Set connection	Model Number	Qty. Required	Description
¾” NPT	DACA-DHWTA-1	1	2 fittings for pump station to solar kit – ¾” female NPT connections
1” NPT	DACA-THXA-1	1	2 fittings for pump station to solar kit – 1” female NPT connections

- Optional Recirculation Loop BSP Kit

Recirculation connection	Model Number	Qty. Required	Description
½” NPT	DACA-MP-1	1	1 fitting for recirculation connection – ½” female NPT connections
¾” NPT	DACA-DHWTA-1	1	2 fittings for recirculation connection – ¾” female NPT connections (only one needed)

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What's in the Box

Tank is shipped with all accessories fixed to outside of tank

3-way Valve & Motor Head

Installation Manual

3 Tank Legs

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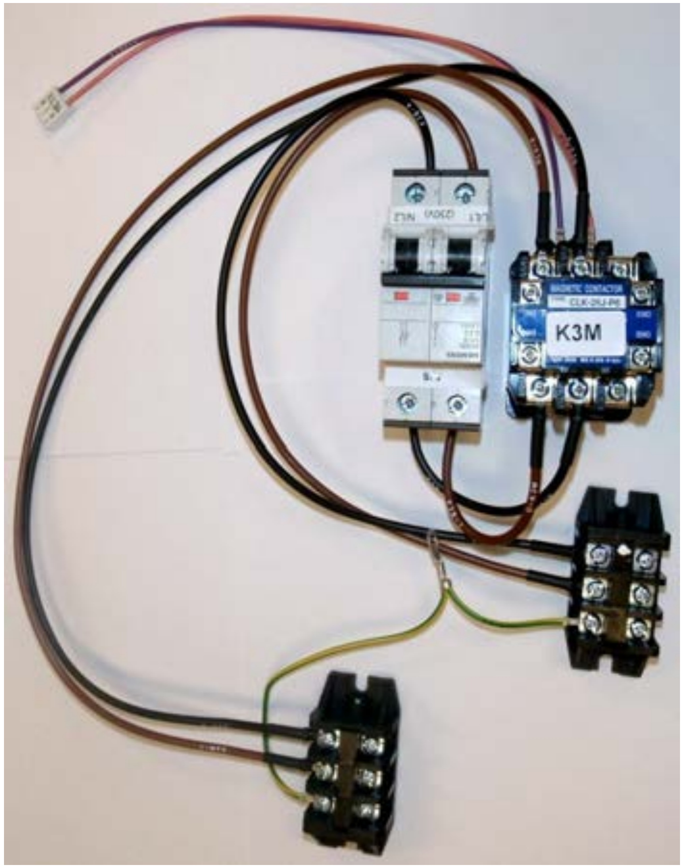
What's in the Box (cont.)



Relay, Terminal Blocks, Switch Harness & Screws

Tank Sensor Assembly
(DO NOT CUT OR EXTEND)

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Installation Considerations

- Daikin Water Tanks are for indoor installations only
- Ambient temperature between 39˚ ~ 95˚F (4˚ ~ 35˚C)
- Be aware that the domestic hot water temperature can/will be higher than the user set point for domestic hot water depending on the selected values of certain field settings (example 2). Refer to the field settings in the installation manual of the indoor unit EKHBH/X or outdoor unit EBLQ, EDLQ.
- If this high domestic hot water temperature can be a potential risk for human injuries, a mixing valve (field supply) shall be installed at the hot water outlet connection of the domestic hot water tank. This mixing valve shall secure that the hot water temperature at the hot water tap never rise above a set maximum value. This maximum allowable hot water temperature shall be selected according to local laws and regulations.
- A drain valve should be installed on or near the cold water connection on the domestic hot water tank.
- A pressure relief valve (field supply) in accordance with relevant local laws and regulations, and with an opening pressure of maximum 145 psi (10 bar) must be connected to the pressure relief valve connection.
- If glycol is used on main water loop or solar connection, an approved pressure relief valve with an opening pressure of maximum 30 psi (2.07 bar) (field supply) must be installed in the inlet of the tank.
- Use only propylene glycol and inhibitor with a toxicity rating or Class of 1.
- Follow local codes.

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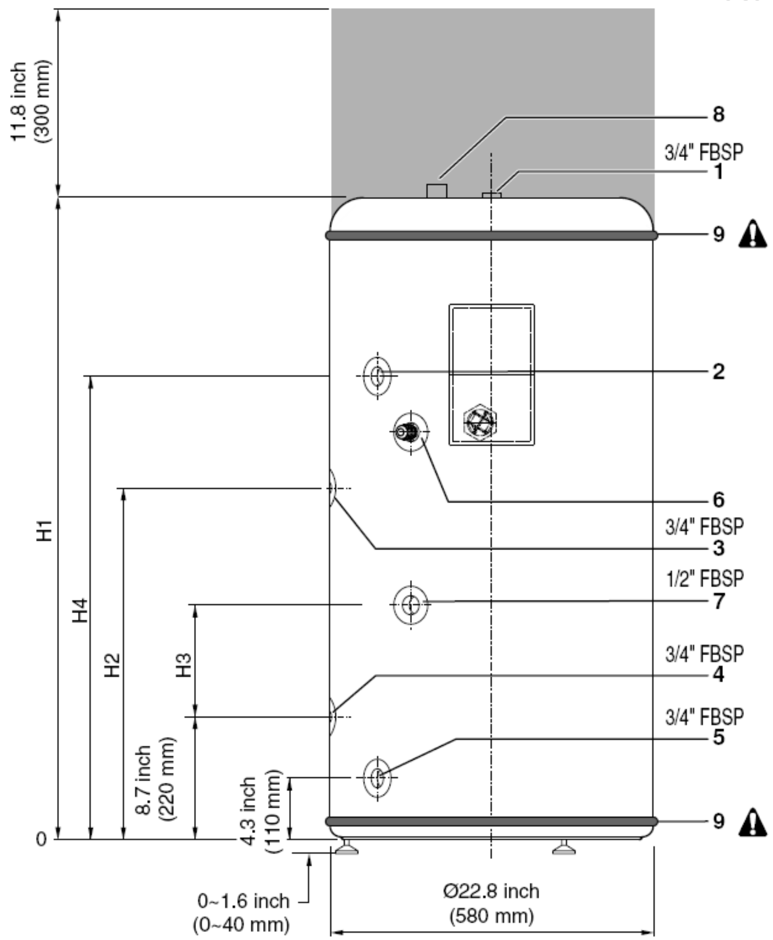
Clearance & Service Space

EKHWS050/80B3VJU



1. Hot water and pressure relief valve connection
2. Recirculation connection
3. Flow inlet (from Hydro-section)
4. Flow outlet (from Hydro-section)
5. Cold water connection
6. Thermistor socket
7. Threaded thermistor hole for use with solar kit option. See Installation manual EKSOLHW*
8. Anode Rod
9. Remove the protective tape from domestic hot water tank

Domestic hot water tank		H1	H2	H3	H4
EKHWS050B3VJU	(inch)	45.3	24.8	7.9	32.7
	(mm)	1150	630	200	830
EKHWS080B3VJU	(inch)	63.0	24.8	7.9	32.7
	(mm)	1600	630	200	830

Shaded gray area shows recommended service space

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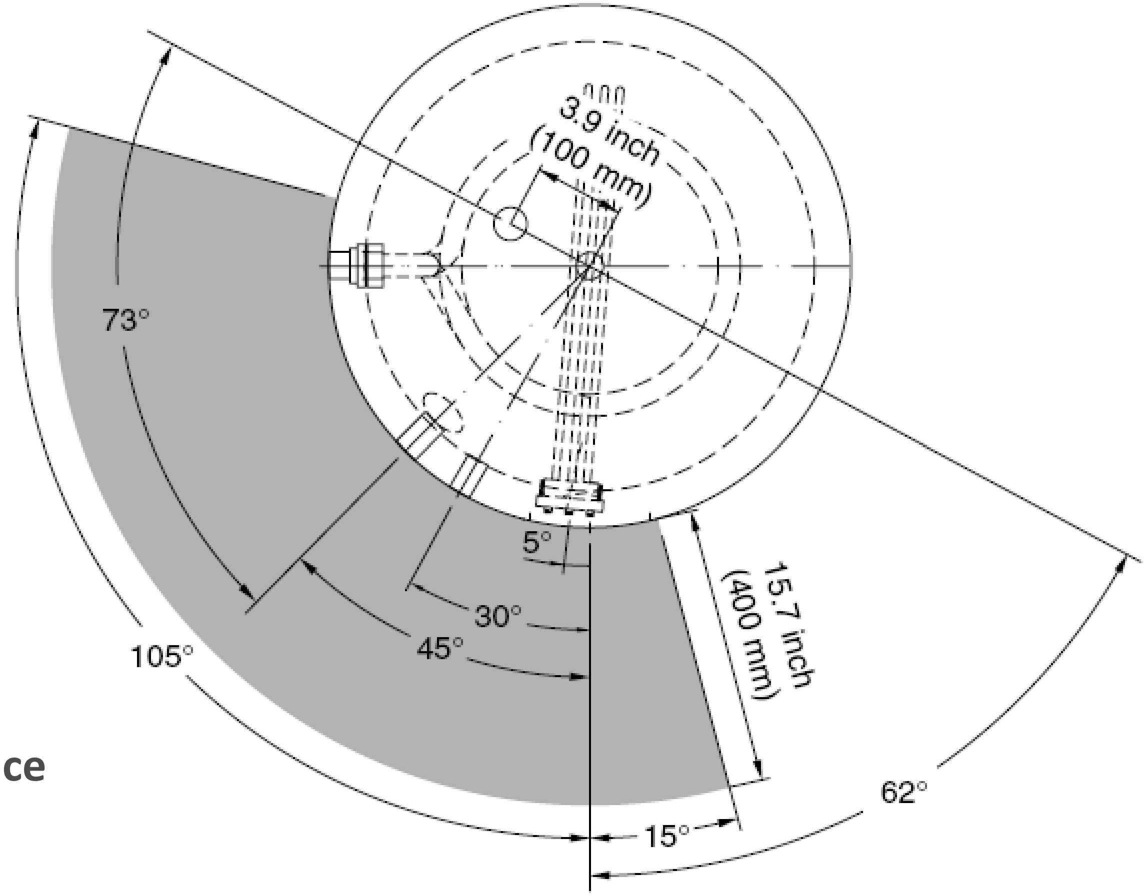
Clearance & Service Space (cont.)

EKHWS050/80B3VJU



Shaded gray area shows recommended service space

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DHW Tank Piping

Important Piping Information

- Domestic and Heat exchanger connections are all ¾” BSPP female.
- Refer to required BSP/NPT kits for NPT connections.
- Heat exchanger supply and return piping is to minimum of 1”, reduce to ¾” at the tank connections. BSP/NPT heat exchanger kit automatically increases connection size to 1” NPT.
- Cold water connection is at the bottom of the tank, it is recommended to install a drain at the same level as the cold water connection.
- Always install mixing valve on domestic hot outlet connection

Domestic Hot Water Out

Optional Recirculation Connection

Main Sensor Well

Optional Solar Well

Heat Exchanger Inlet

Heat Exchanger Outlet

Domestic Cold Water In

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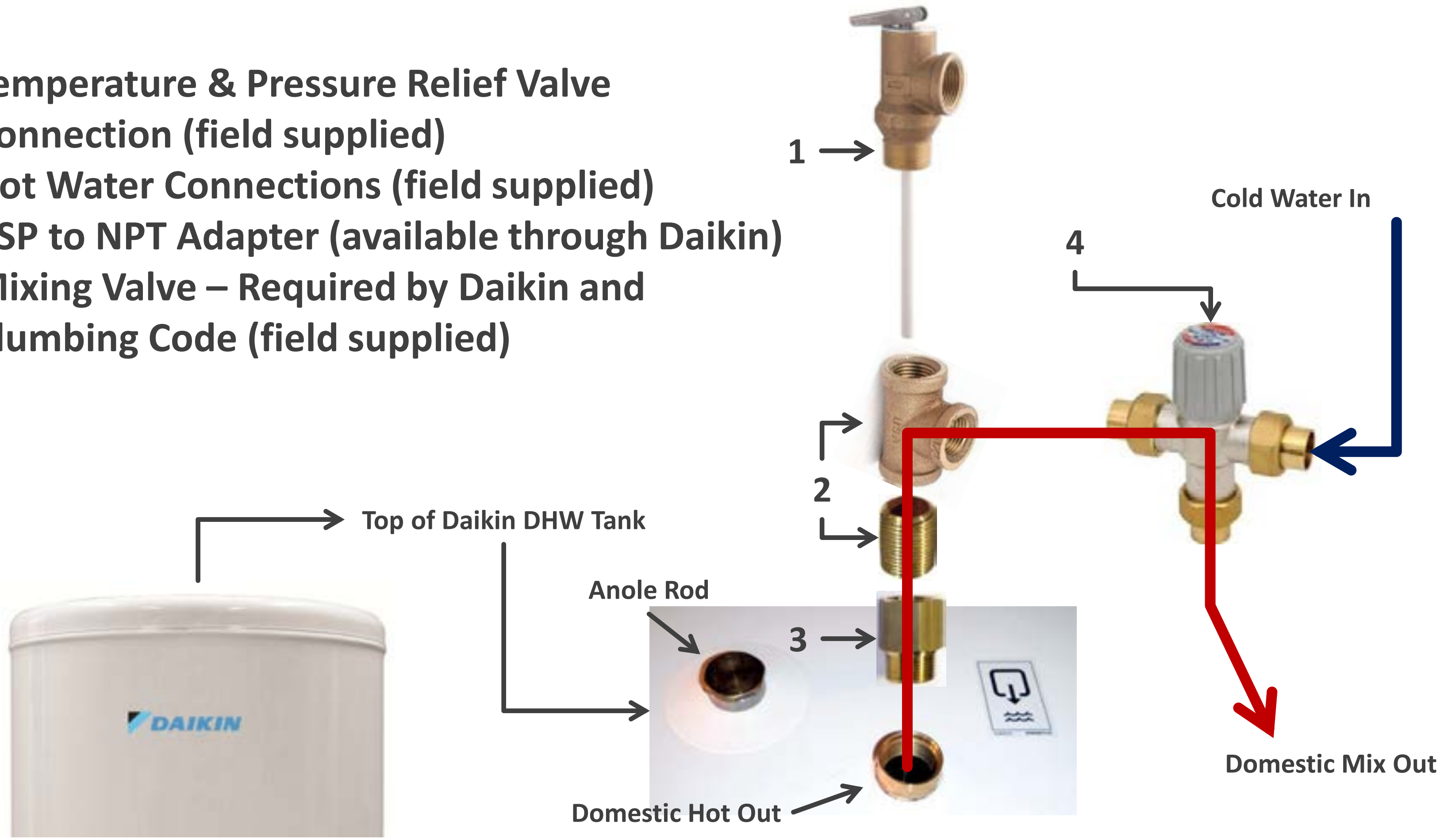
DHW Tank Piping – Domestic Hot Connection

1. Temperature & Pressure Relief Valve Connection (field supplied)
2. Hot Water Connections (field supplied)
3. BSP to NPT Adapter (available through Daikin)
4. Mixing Valve – Required by Daikin and Plumbing Code (field supplied)



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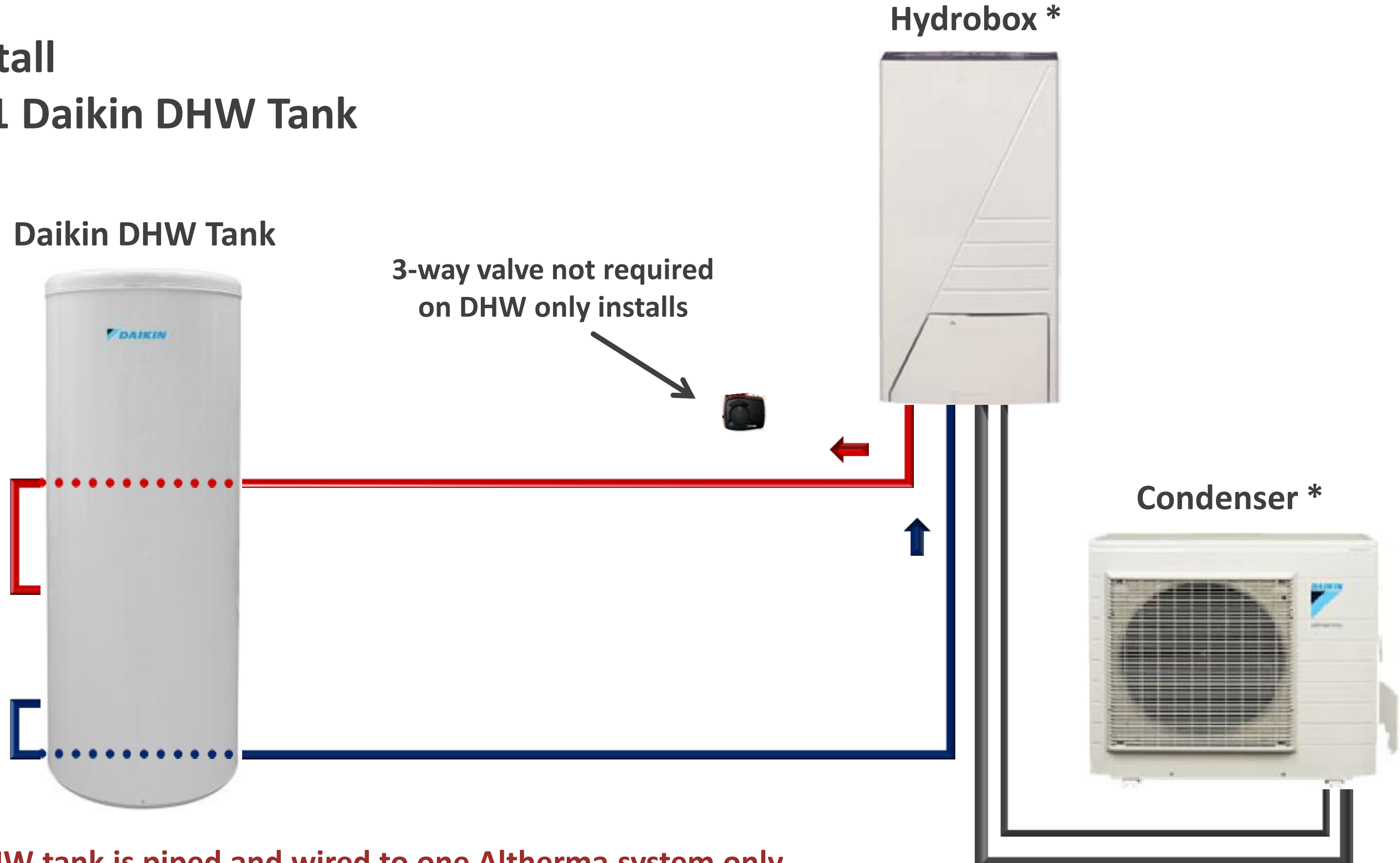
DHW Tank Piping – DHW Heat Exchanger Only

DHW Only Install
1 Altherma – 1 Daikin DHW Tank

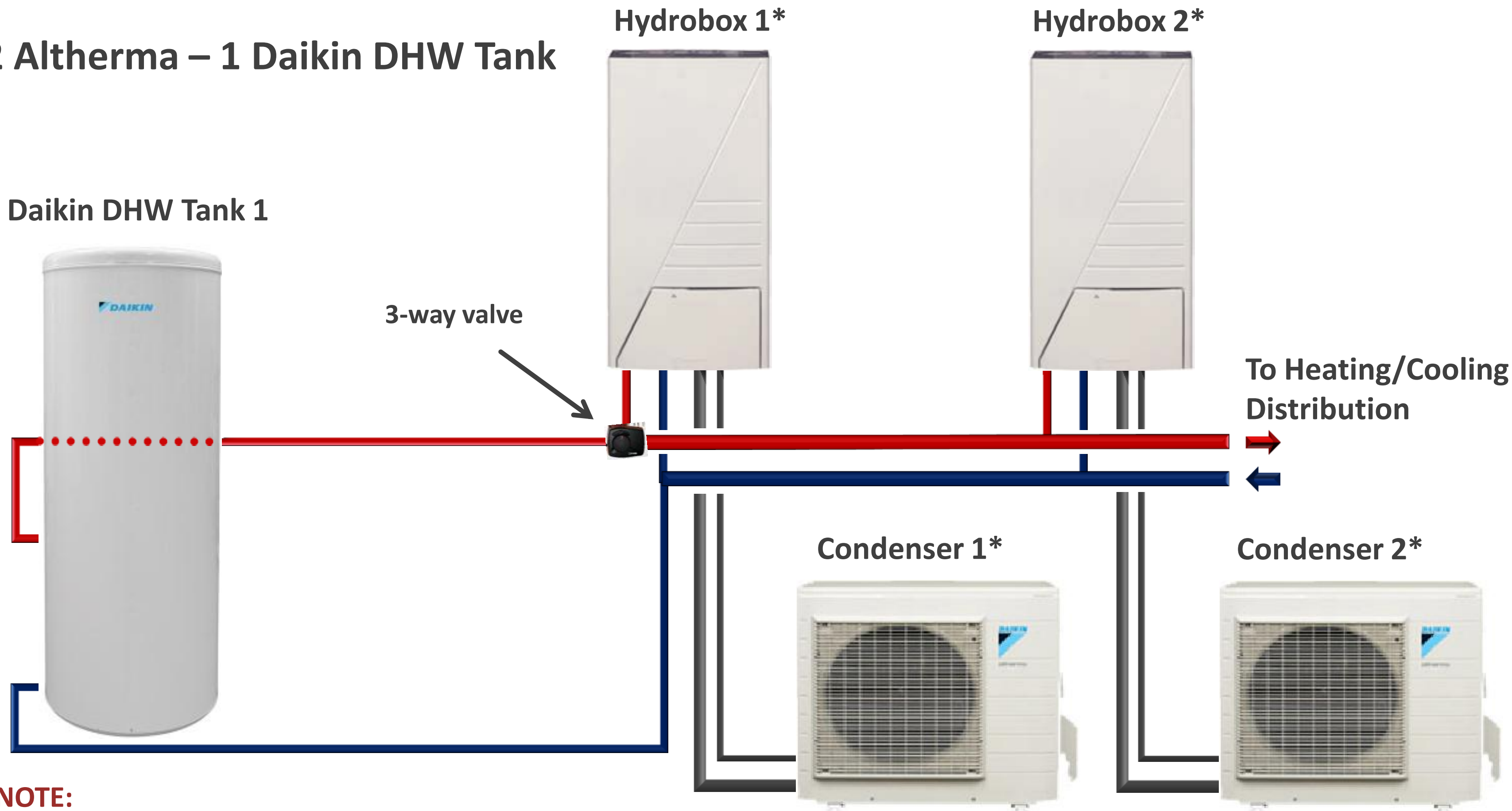


NOTES:

- Each Daikin DHW tank is piped and wired to one Altherma system only.
- Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc. Relief valve, BSP/NPT adapters & isolation valves not shown.

DHW Tank Piping – DHW Heat Exchanger Only (cont.)

2 Altherma – 1 Daikin DHW Tank



NOTE:
- **Only one Altherma can connect to one Daikin DHW tank.**

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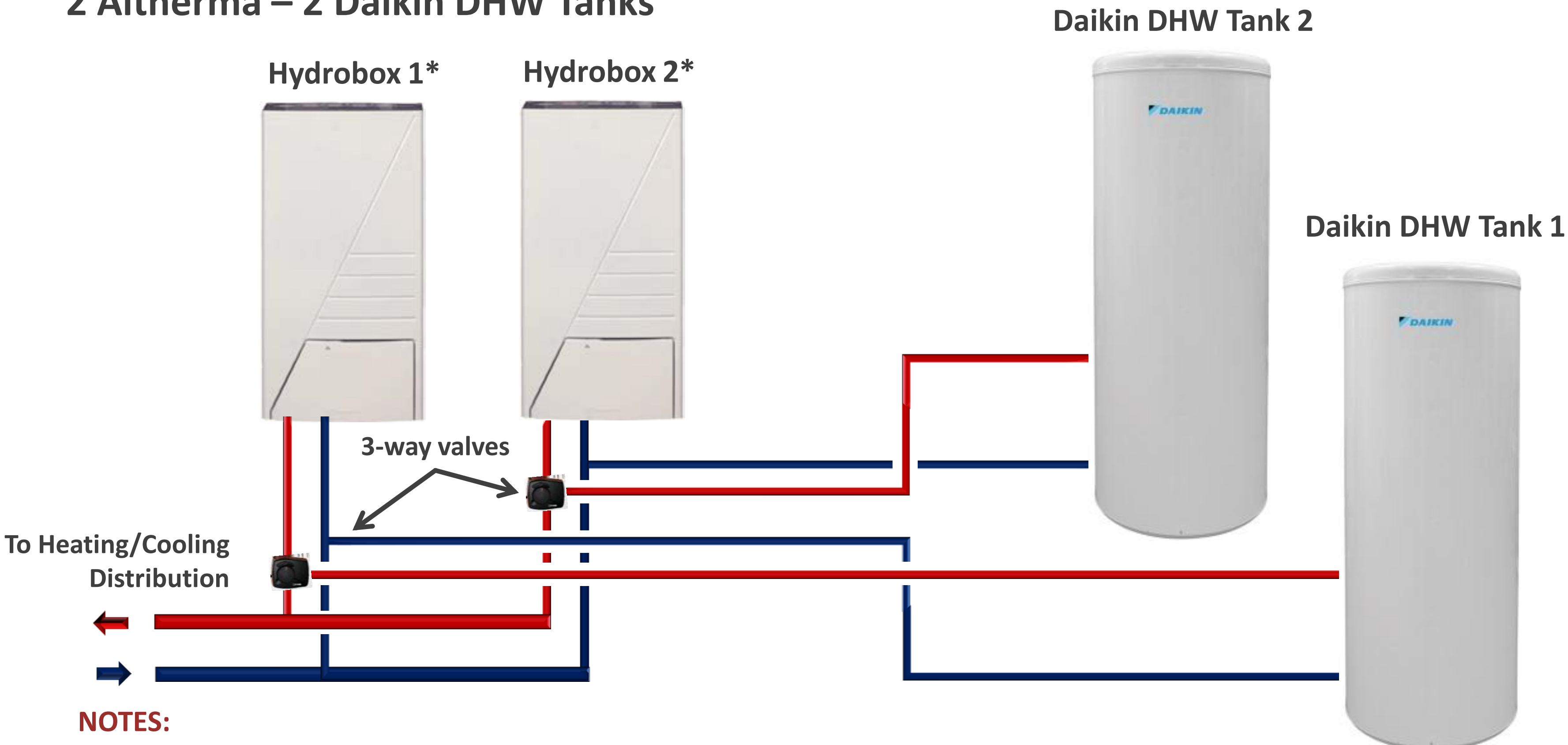
DHW Tank Piping – DHW Heat Exchanger Only (cont.)

2 Altherma – 2 Daikin DHW Tanks



NOTES:

- Each Daikin DHW tank is piped and wired to one Altherma system only.
- Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc. Relief valve, BSP/NPT adapters & isolation valves not shown.

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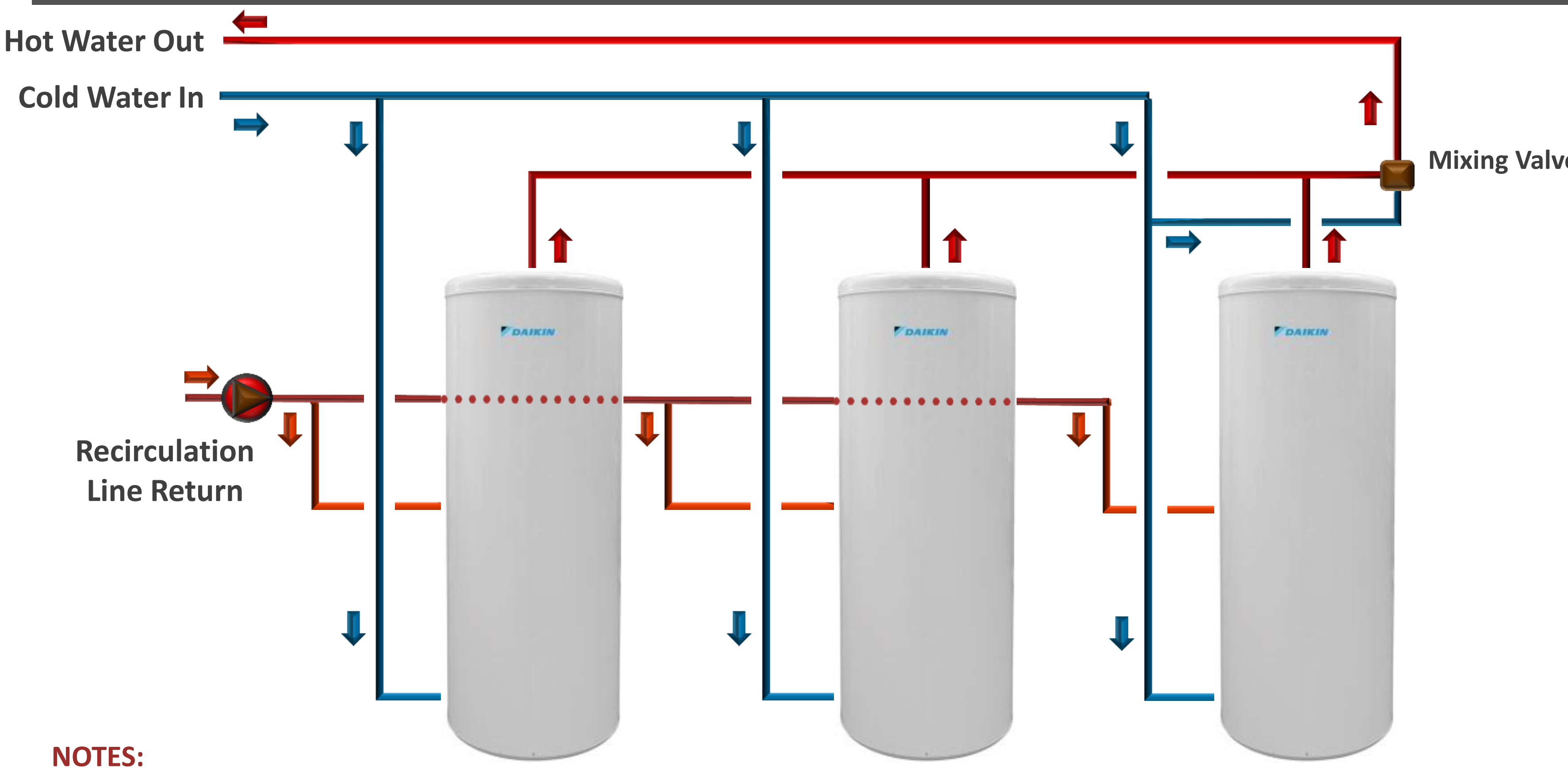
Multiple DHW Tanks – Domestic Piping



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NOTES:

- **Each Daikin DHW tank is piped and wired to one Altherma system only.**
- **Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc. Relief valve, BSP/NPT adapters & isolation valves not shown.**

3-way Valve Installation

All Models

DHW Tank Requirements	
Maximum allowable distance between 3-way valve and the Mono-bloc/hydrobox (only for installations with domestic hot water tank – 3-way valve supplied with domestic hot water tank).	10 ft (3 m)
Maximum allowable distance between the domestic hot water tank and the Mono-bloc/hydrobox (only for installations with domestic hot water tank). The thermistor cable supplied with the domestic hot water tank is 39.4 ft (12 m) in length. (DO NOT CUT OR EXTEND)	32.8 ft (10 m)

Piping to DHW Tank heat exchanger must be 1” minimum.

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3-way Valve Installation (cont.)

3-way Valve Install Overview

- The Daikin DHW tank installation instructions tell how to install the 3-way valve starting on page 6.
- Each step is very important and should be read prior to installing the 3-way valve.
- If the 3-way valve is operated and found to be out of sync, the installation instructions will no longer help.
- If this happens use the Re-sync procedure. Located at the end of this presentation and in the Daikin Altherma Quick Startup & Reference Guide.

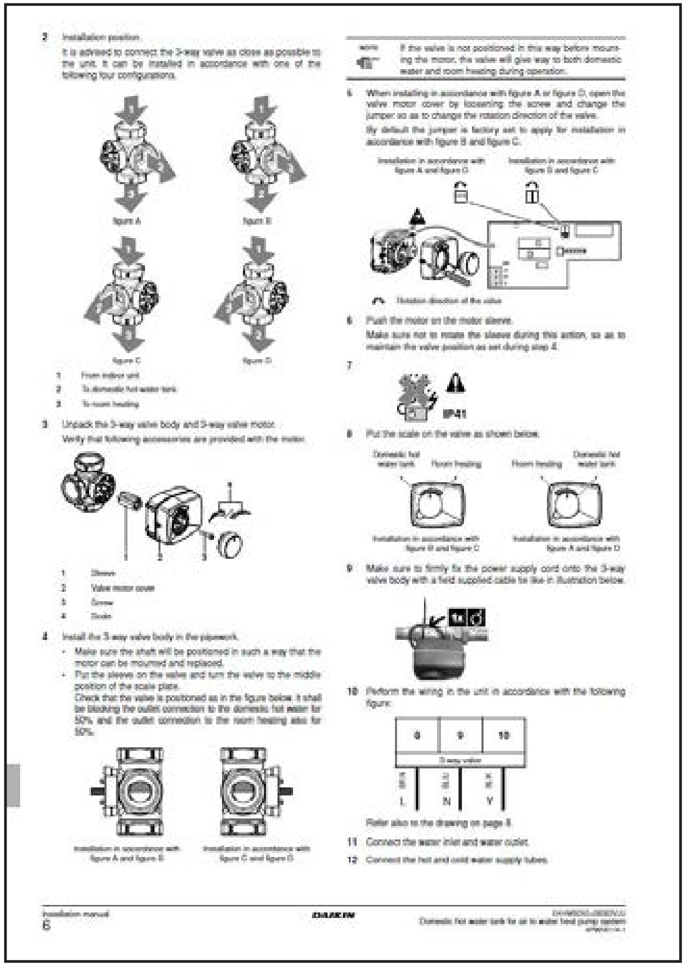

2 Installation position.
It is advised to connect the 3-way valve as close as possible to the unit. It can be installed in accordance with one of the following four configurations.

figure A
figure B
figure C
figure D

1 From indoor unit
2 To domestic hot water tank
3 To room heating

3 Unpack the 3-way valve body and 3-way valve motor.
Verify that following accessories are provided with the motor.

1 Sleeve
2 Valve motor cover
3 Screw
4 Diode

4 Install the 3-way valve body in the pipework.
- Make sure the shaft will be positioned in such a way that the motor can be mounted and replaced.
- Put the sleeve on the valve and turn the valve to the middle position of the scale plate.
Check that the valve is positioned as in the figure below. It shall be blocking the outlet connection to the domestic hot water for 50% and the outlet connection to the room heating also for 50%.

Installation in accordance with figure A and figure B
Installation in accordance with figure C and figure D

NOTE If the valve is not positioned in this way before mounting the motor, the valve will give way to both domestic water and room heating during operation.

5 When installing in accordance with figure A or figure D, open the valve motor cover by loosening the screw and change the jumper so as to change the rotation direction of the valve.
By default the jumper is factory set to apply for installation in accordance with figure B and figure C.

Installation in accordance with figure A and figure D
Installation in accordance with figure B and figure C

Rotation direction of the valve

6 Push the motor on the motor sleeve.
Make sure not to rotate the sleeve during this action, so as to maintain the valve position as set during step 4.

7

IP41

8 Put the scale on the valve as shown below.

Domestic hot water tank
Room heating
Room heating
Domestic hot water tank

Installation in accordance with figure B and figure C
Installation in accordance with figure A and figure D

9 Make sure to firmly fix the power supply cord onto the 3-way valve body with a field supplied cable tie like in illustration below.

10 Perform the wiring in the unit in accordance with the following figure:

8 9 10
3-way valve
L N Y

Refer also to the drawing on page 8.

11 Connect the water inlet and water outlet.
12 Connect the hot and cold water supply tubes.

Installation manual
6
DAIKIN
Domestic hot water tank for air to water heat pump system

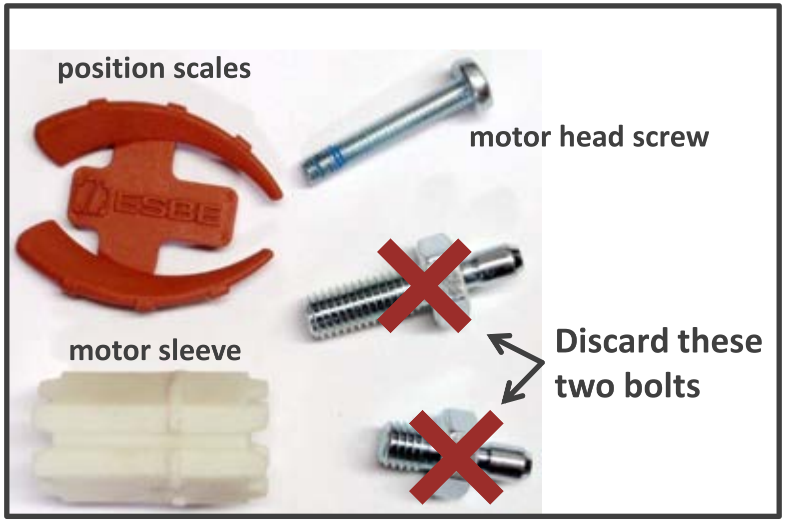
3-way Valve Installation (cont.)

3-way Valve Components

- The 3-way valve comes with a motor, valve body and a small bag of parts that contains; 2 valve position scale, one motor head screw, motor sleeve and two bolts.

3-way Valve Motor

Small Bag of Parts



3-way Valve Body

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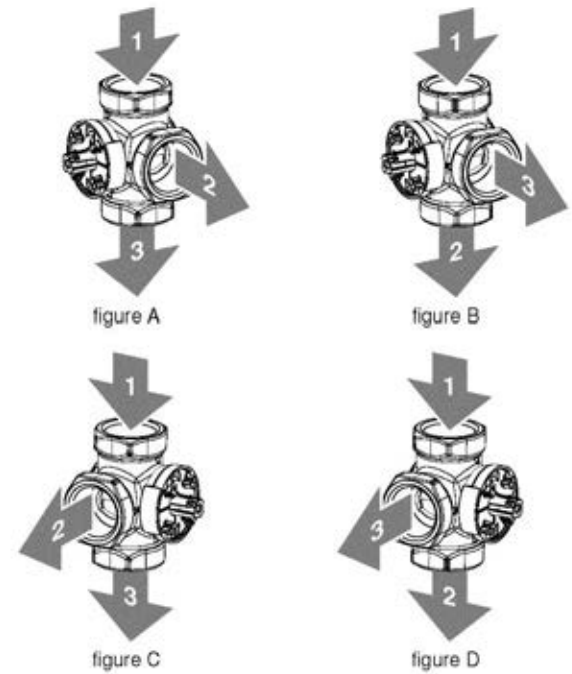
3-way Valve Installation (cont.)

Step 1:

- Decide valve configuration works best for your install; A, B, C or D.
- Configurations A and C will provide better water flow to space heating and cooling.
- This should be marked down on the Daikin Altherma Commissioning Report.

2 Installation position.

It is advised to connect the 3-way valve as close as possible to the unit. It can be installed in accordance with one of the following four configurations.



1	From indoor unit
2	To domestic hot water tank
3	To room heating

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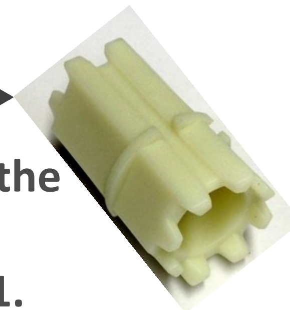
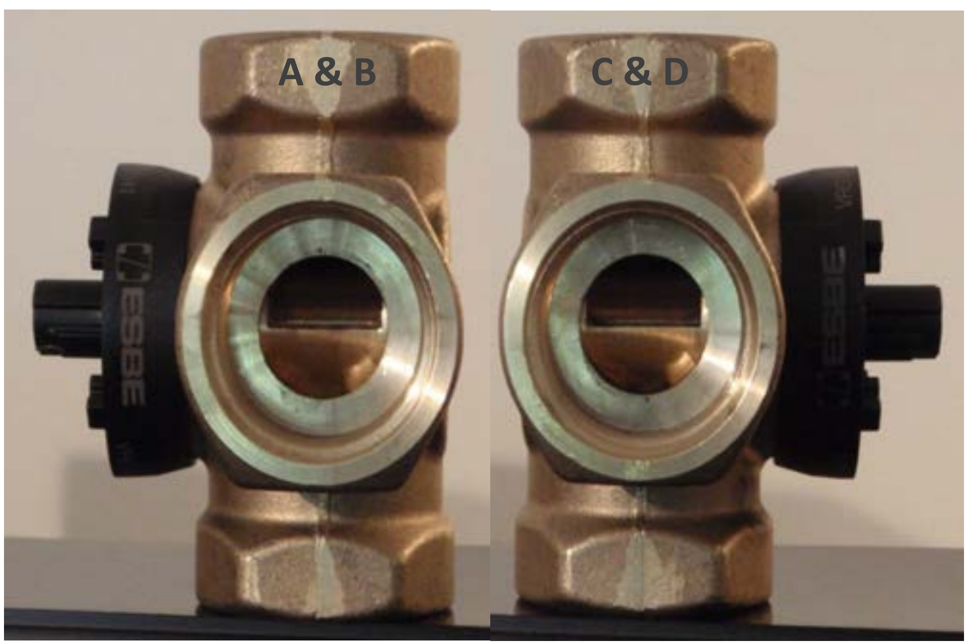
3-way Valve Installation (cont.)

Step 2:

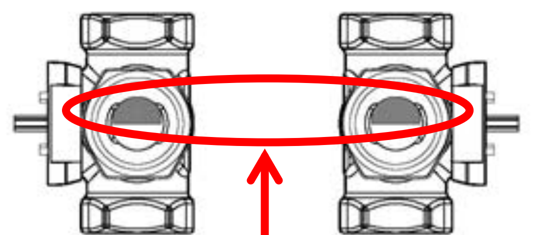


- Using the white sleeve rotate the diverter to match the install configuration chosen on step 1.



4 Install the 3-way valve body in the pipework.

- Make sure the shaft will be positioned in such a way that the motor can be mounted and replaced.
- Put the sleeve on the valve and turn the valve to the middle position of the scale plate.
  Check that the valve is positioned as in the figure below. It shall be blocking the outlet connection to the domestic hot water for 50% and the outlet connection to the room heating also for 50%.



Installation in accordance with figure A and figure B

Installation in accordance with figure C and figure D

Note: Shaded area is open, diverter is white area below shaded

3-way Valve Installation (cont.)

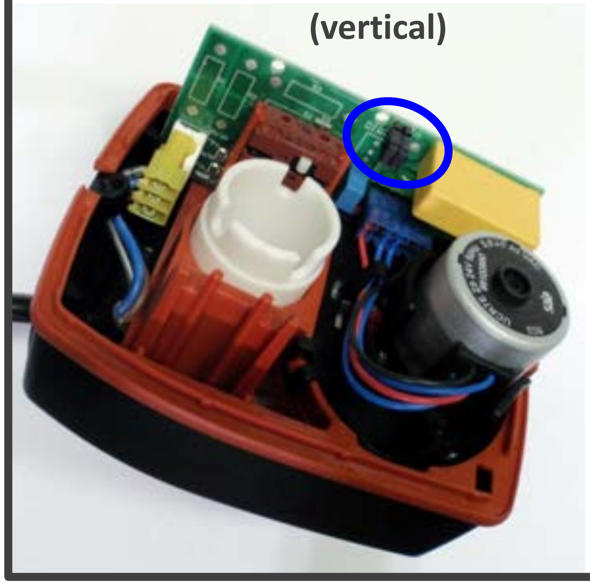
Step 3:

- The correct jumper position needs to be checked.

5 When installing in accordance with figure A or figure D, open the valve motor cover by loosening the screw and change the jumper so as to change the rotation direction of the valve.

By default the jumper is factory set to apply for installation in accordance with figure B and figure C.

Jumpers factory set for B & C (vertical)



Remove and rotate ¼ turn

Reinstall as shown for A & D (horizontal)

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3-way Valve Installation (cont.)

Step 4:

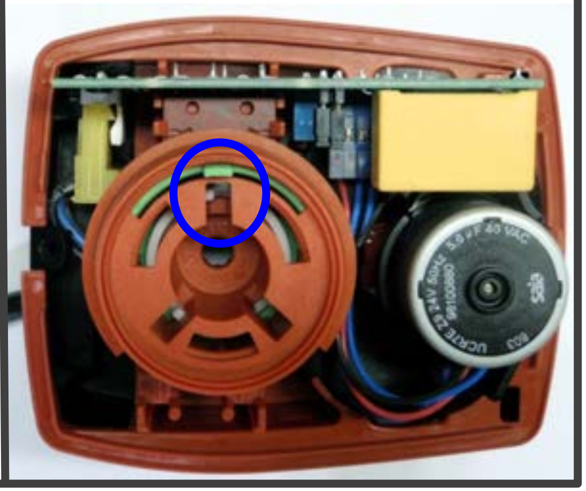
- Use these pictures to help reinstall motor stack assembly

Motor Stack Pieces

Take note of tabs on white barrel

Place orange ring on barrel, be sure to line up tabs

Install red and green pieces, green tab should be center of slot



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3-way Valve Installation (cont.)

Step 5:

- Replace cover and screw

Step 6:

- Install white sleeve

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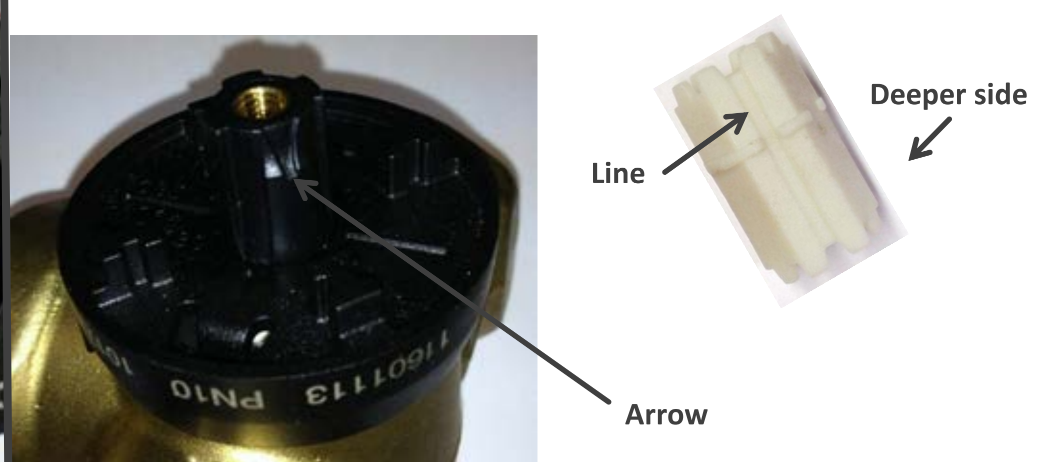
Place cover on motor head and reinstall cover screw

Place white sleeve on steam of valve body. Line up arrow of steam with line on sleeve. Deeper side towards valve body.



3-way Valve Installation (cont.)

Step 7:

- **Place motor on valve and insert and tighten down the screw provided. Be careful not to over tighten screw. Just past snug tight is perfect.**

Place motor over valve and sleeve

Insert screw and tighten down

Screw has blue thread lock on it, do not over tighten

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3-way Valve Installation (cont.)

Step 8:

- Insert knob into motor head. To line up, gently turn and press into place.

If the knob's red ring is exposed the valve can be operated manually.

When the knob is pressed fully into the motor, the knob cannot be operated by hand. Only the motor will control the valve’s operation

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3-way Valve Installation (cont.)

Step 9:

- **Insert scale onto motor head**

Insert scale onto motor head. Knob should point towards small end of scale when unit is in DHW mode.

B & C Scale

A & D Scale

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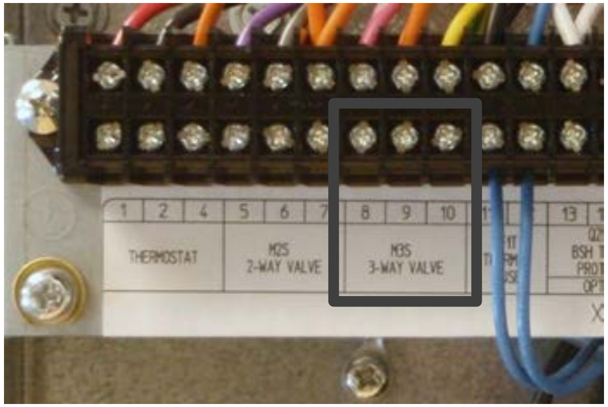
3-way Valve Installation (cont.)

Step 10:

- Wire the 3-way valve back to the X2M terminal block in the Altherma's control box.
- The motor comes with a 5' wire harness.
- Be sure to secure wire to pipe.

3-way Valve	Altherma Control Box – X2M
Brown wire	Terminal 8
Blue wire	Terminal 9
Black wire	Terminal 10

X2M – Terminal Block



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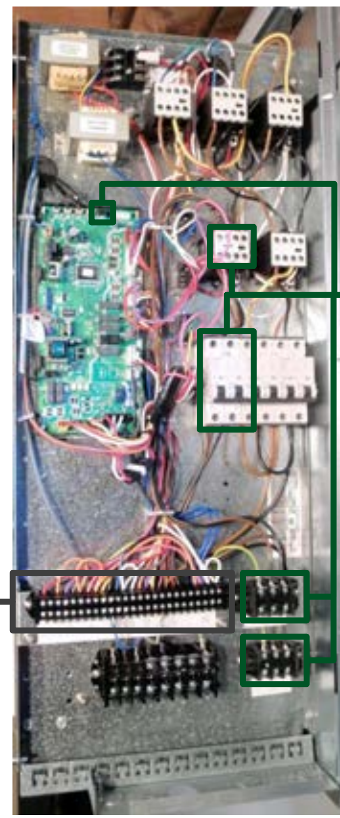
Field Wiring – Hydrobox Control Box

Heat/Cool with DHW Option



DHW Tank Option Relay, Breaker, Terminal Blocks & Thermistor Cable

X2M Terminal Block

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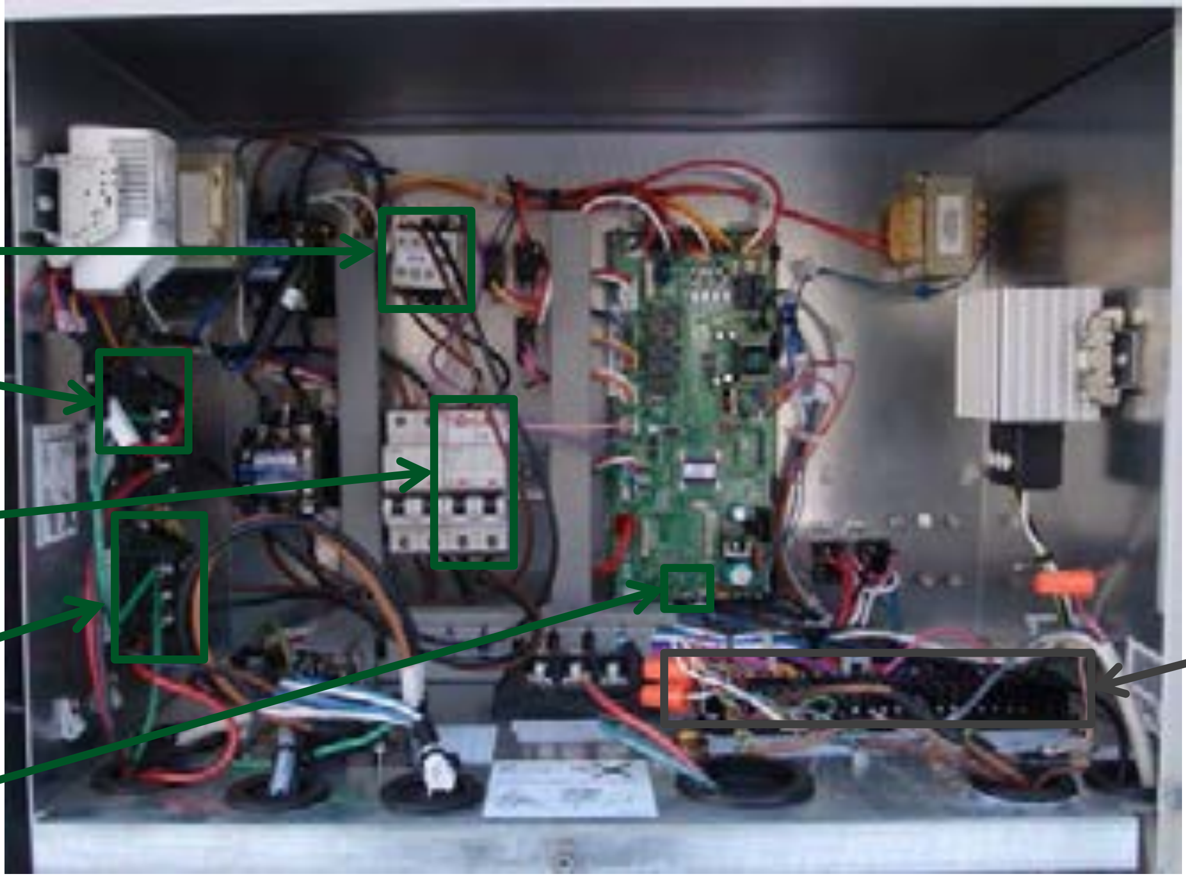
Field Wiring – MonoBloc Control Box

EDLQ/EBLQ036/48/54 Control Box

Items below come with DHW Tank



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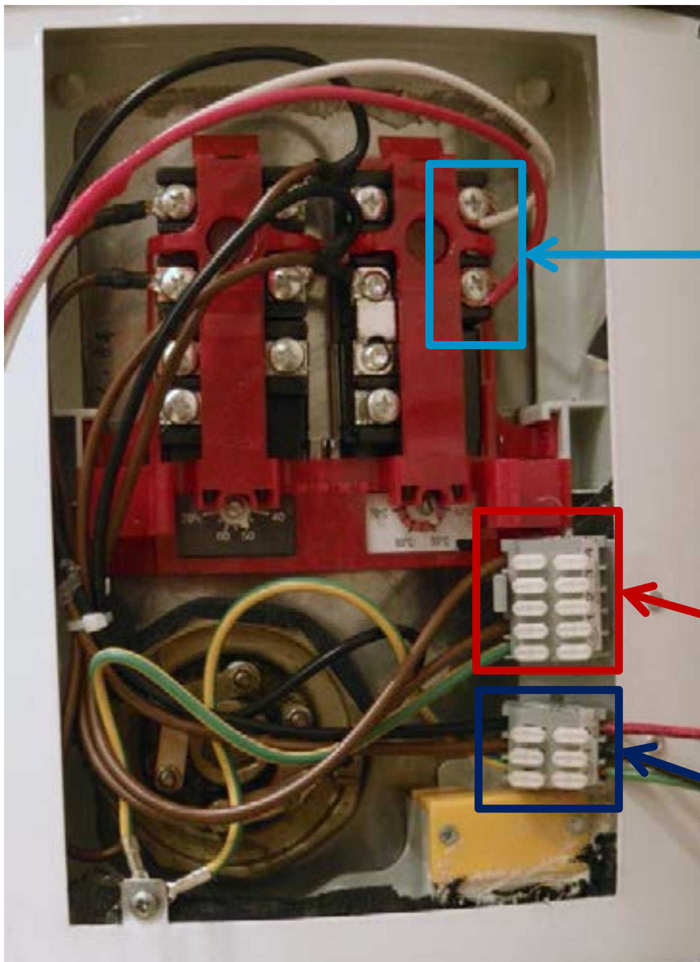
Field Wiring – Water Tank Connections



Q3L Overload connections

Safety from Altherma Control box

X2M 13, 14

X8M Terminal Block

For Daikin Solar Kit connections only

X6M Terminal block

Power from Altherma Control box X4M

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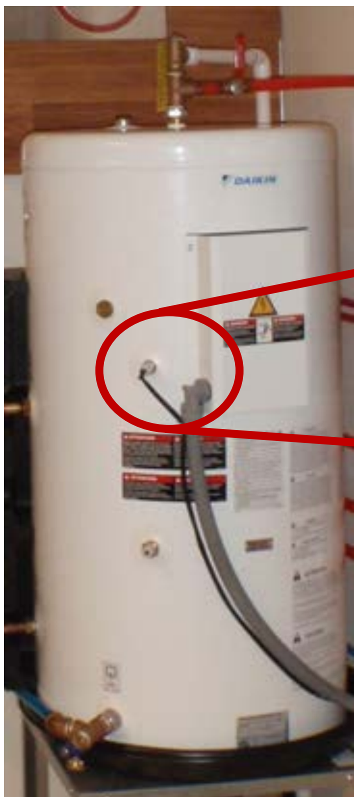
Field Wiring – Water Tank Connections (cont.)

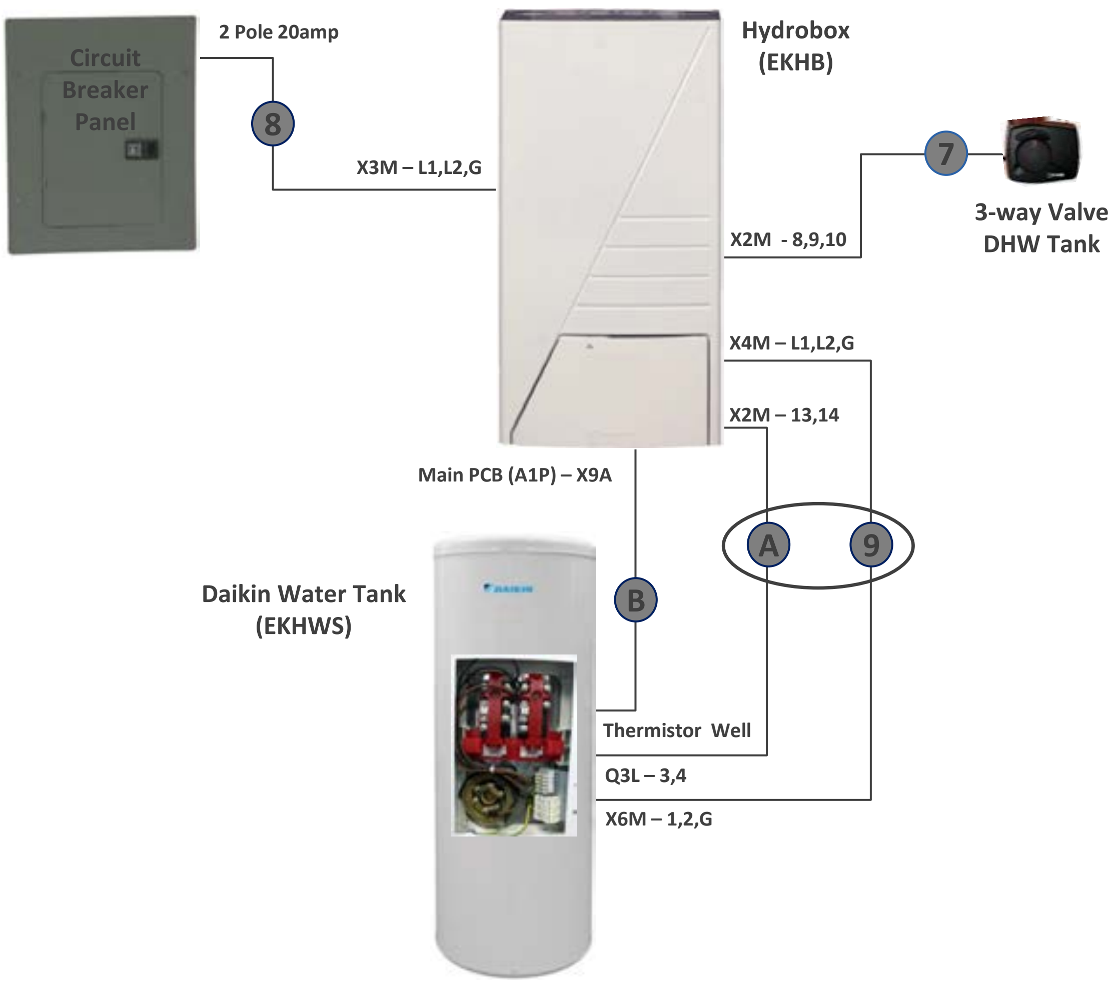
- **Connection of the sensor inside the domestic hot water tank.**



Daikin DHW Tank

NOTE: Zip-tie and sleeve should be touching well nut. If it is not the sensor is not properly inserted in well.

Field Wiring DHW with Hydrobox



Typical Wire & Breaker Sizes*				
	Wire #	Qty - Gauge	Note:
Water Tank	7	3 - #16	- - -
	8	3 - #12	20amp 2 Pole
	9	3 - #12	- - -
	A	2 - #12	- - -
	B	Factory Supplied	DO NOT CUT OR EXTEND

Only Wiring Related to DHW Tank option is shown, see installation manual of main unit for a complete wiring diagram.

Wires: A & 9 can be run together*
Both sets of wires have 208/240VAC present

K3M, F2B, X3M, X4M, Wire #B Tank sensor and 3-way valve supplied with Daikin Water Tank

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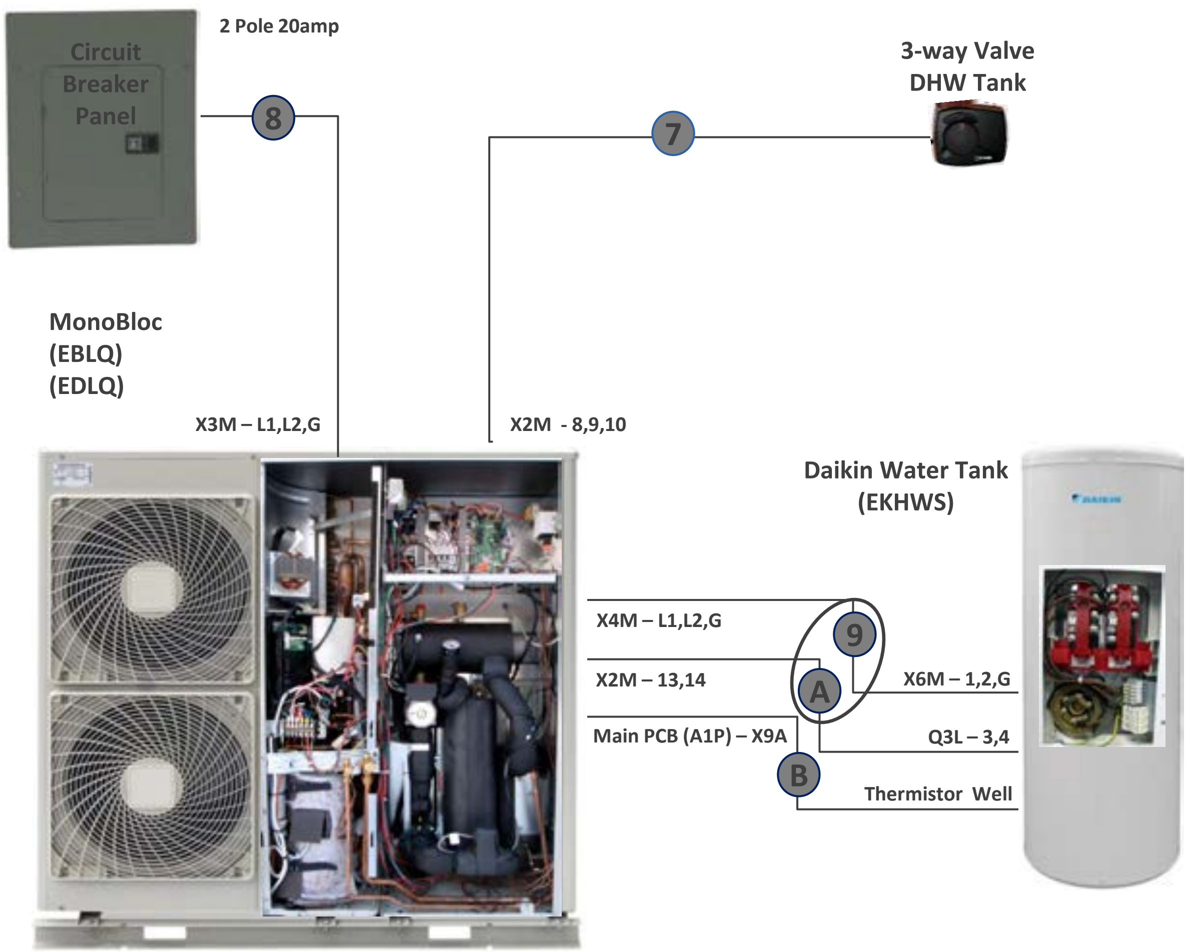
Field Wiring DHW with MonoBloc



Typical Wire & Breaker Sizes*			
	Wire #	Qty - Gauge	Note:
Water Tank	7	3 - #16	- - -
	8	3 - #12	20amp 2 Pole
	9	3 - #12	- - -
	A	2 - #12	- - -
	B	Factory Supplied	DO NOT CUT OR EXTEND

Only Wiring Related to DHW Tank option is shown, see installation manual of main unit for a complete wiring diagram.

Wires: A & 9 can be run together*

K3M, F2B, X3M, X4M, Wire #B (tank sensor) and 3-way valve supplied with Daikin Water Tank

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* Electrical work is to comply with ALL local electrical codes

Daikin Solar Kit

Daikin Solar Kit – EKSOLHWBAVJU

- **Daikin Solar Kit allows the integration of field supplied thermal solar collectors.**
- **When solar energy is available, the Daikin Solar Kit in combination with collectors and pump station will transfer the heat from the sun to the DHW tank.**
- **Collectors and solar pump stations and all necessary piping are field supplied.**
- **It is not recommended to install more than 3 collectors per Daikin DHW tank.**
- **If glycol is used on main water loop or solar connection, an approved pressure relief valve with an opening pressure of maximum 30 psi (2.07 bar) (field supply) must be installed in the inlet of the tank.**
- **Only use only propylene glycol with inhibitor**
- **Glycol and inhibitor can only have a toxicity rating or Class of 1.**
- **Follow local codes.**

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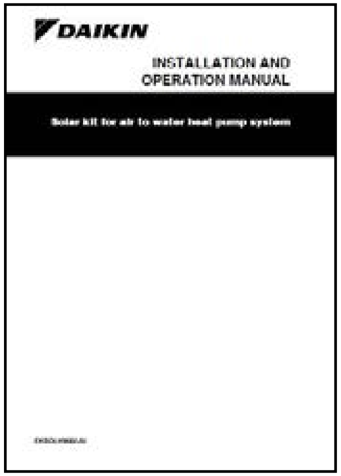
Daikin Solar Kit (cont.)

What's in the Box

- 1 heat exchanger assembly with pump
- Insulation sections front & back
- 5 male by male brass fittings
- 1 male by male brass fitting
- 1 female by male brass nipple
- 7 Sealing Rings
- 1 Sensor Well
- EKRP1HB Digital I/O PCB kit
- Instruction Manual



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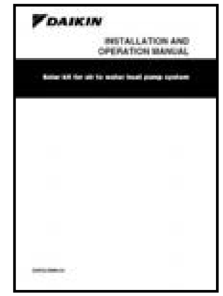
Altherma Solar Kit Specifications



		EKSOLHWBAVJU
Dimensions	Height	31 3/8 inch / 795 mm
	Width	13 1/2 inch / 305 mm
	Depth	11 5/8 inch / 295 mm
Weight Empty		17.6 lb / 8 kg
Power Supply		Via DHW tank - via the condenser: 1PH 208/230V/60Hz
Maximum Inlet Temperature		230°F (110°C)
Pump		1 speed / water cooled / 46W
Connections		¾" FBSP (Female British Standard Pipe (Parallel))

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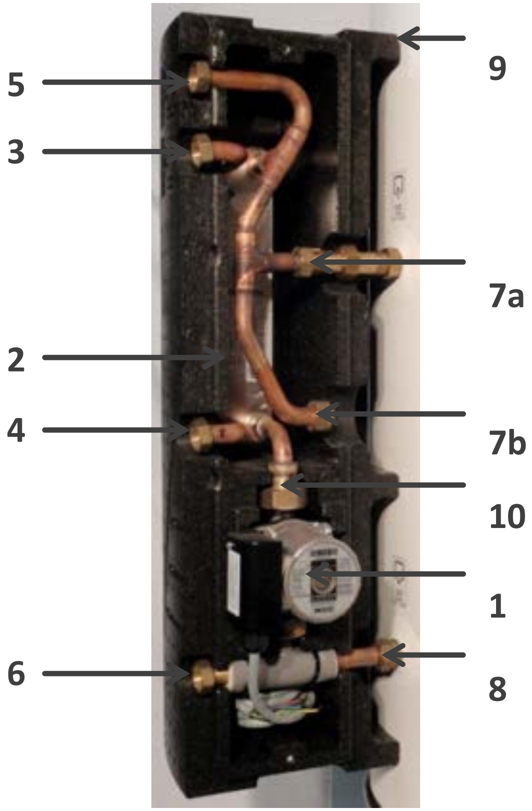
Daikin Solar Kit (cont.)



EKSOLHWBAVJU

1. Daikin Solar Kit allows the integration of field supplied thermal solar collectors.
2. Heat exchanger
3. Inlet connection from solar pump station
4. Return connection to solar pump station
5. Inlet connection from Indoor unit/DHW 3-way valve
6. Return connection to the indoor unit distribution piping
7. (a) Return connection to DHW tank heat exchanger
8. (b) Not applicable
9. Inlet connection from the DHW tank heat exchanger
10. EEP casing
11. Non-return valves

PUBLIC

Required BSP Kits for Solar Kit

- Solar Kit (EKSOLHWBAVJU) BSP Kits

Solar Line Set connection needed	Model Number	Qty. Required	Description
¾" NPT	DACA-DHWTA-1	1	2 fittings for pump station to solar kit – ¾" female NPT connections
1" NPT	DACA-THXA-1	1	2 fittings for pump station to solar kit – 1" female NPT connections

- Although the below are required for solar kit installation, they are ordered with the DHW Tank. Only one set is needed per Daikin DHW Tank and Solar Kit.

Model Number	Qty. Required	Description
DACA-THXA-1	1	2 fittings for supply loop to DHW heat exchanger – 1" female NPT connections

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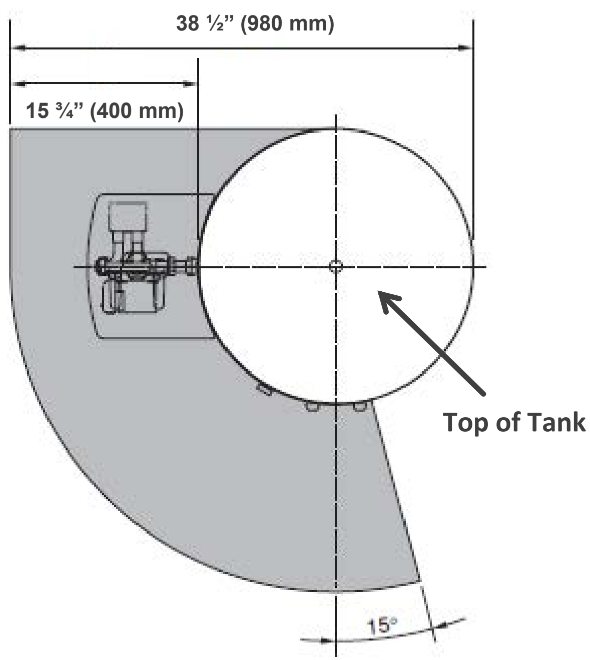
Daikin Solar Kit (cont.)

Service & Clearance Space

- The Solar Kit does not require any additional space above what is needed for the DHW tank on its own.



- Shaded grey area shows recommended clearance space

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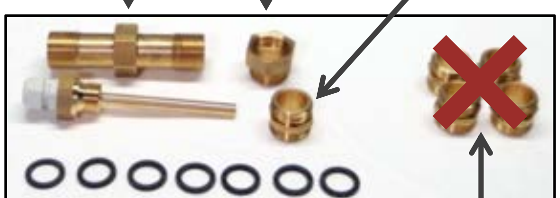
Daikin Solar Kit (cont.)

Tank Side Water Connections

- Use the BSP/BSP and sealing rings supplied with the solar kit for the tank side connections.
- Be careful not to over tighten the sealing rings. Max. torque 3.69 ft/lb (5 N/m)
- Any sealant used needs to withstand temperature operation range of solar kit Max. fluid temp – 33.8~212^{0}F (1~100^{0}C)

nipple – female by male – male by male



Solar sensor well

sealing rings

Discard four of the 5 similar fittings

BSP/BSP adapters tank side connections

sealing ring – nipple – sealing ring – female by male

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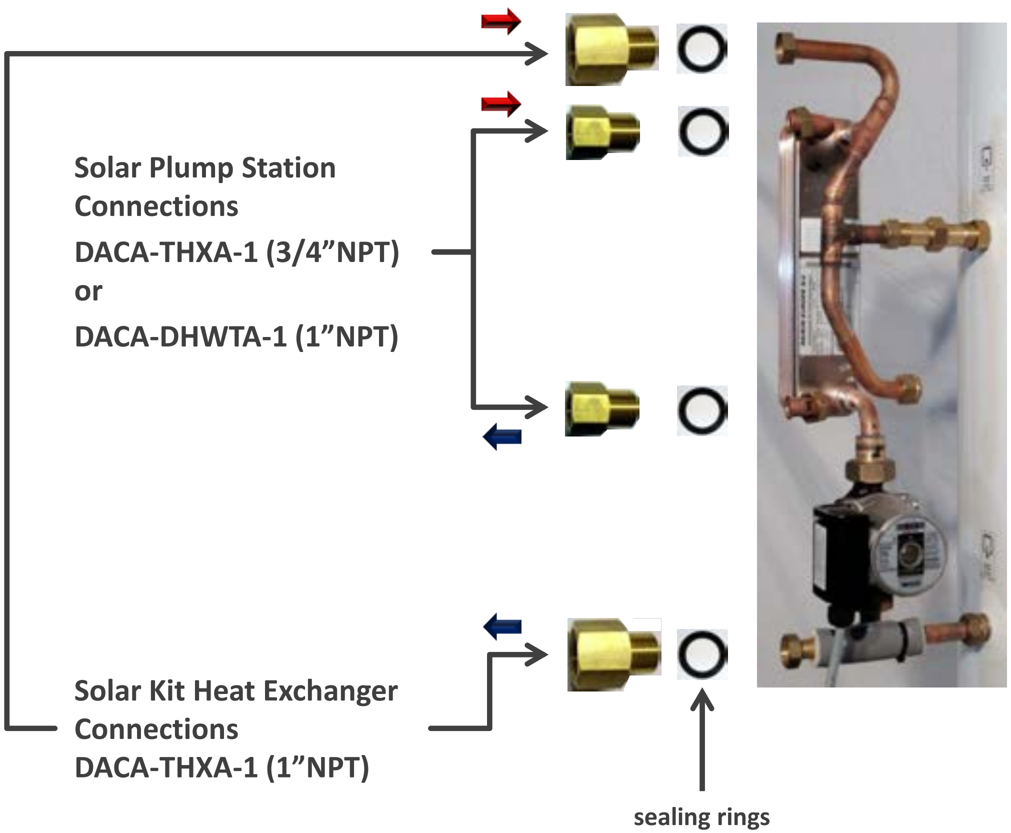
Daikin Solar Kit (cont.)

Distribution Side Water Connections

- BSP Kits are needed for the DHW Tank heat exchanger & solar pump station connections.
- ¾" & 1" BSP/NPT Kits are available for Solar Pump Station connection
- Any sealant used needs to withstand temperature operation range of solar kit Max. fluid temp – 33.8~212^{o}F (1~100^{o}C)

BSP/NPT adapters distribution side connections



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Daikin Solar Kit (cont.)

Distribution Side Water Connections (cont.)

- Remove factory installed plug from solar well location and install solar well.
- Install sensor from solar pump station in solar well.

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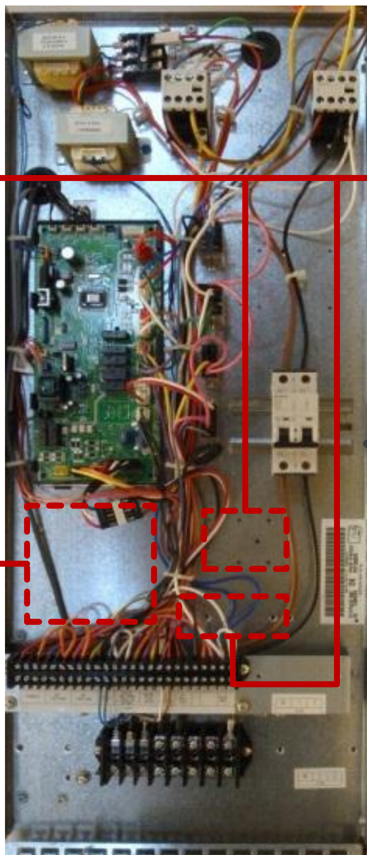
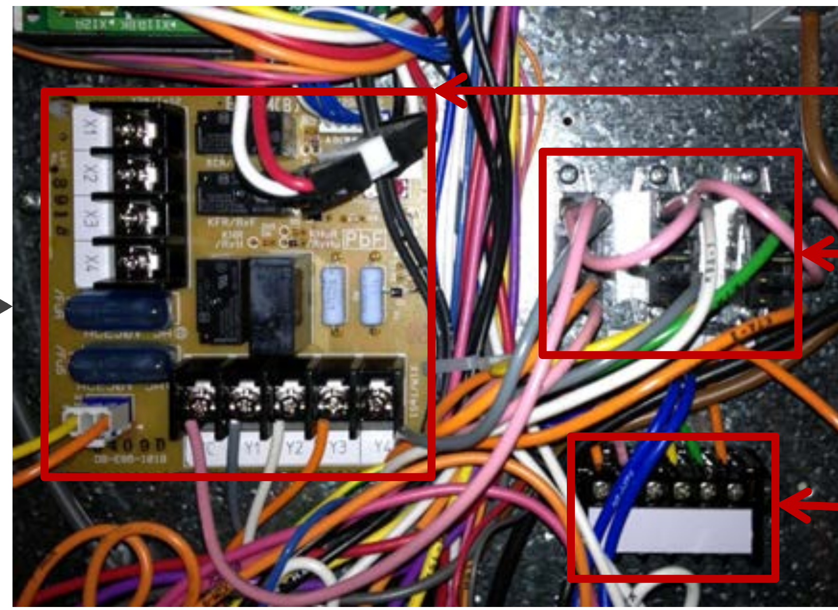
Daikin Solar Kit (cont.)

Installing the EKRP1HB Adapter Board Kit – Hydrobox



EKRP1HBAAU PCB, Relays & Terminal Block Locations



A4P PCB

K5A, K6A, K7A Relays

X7M Terminals

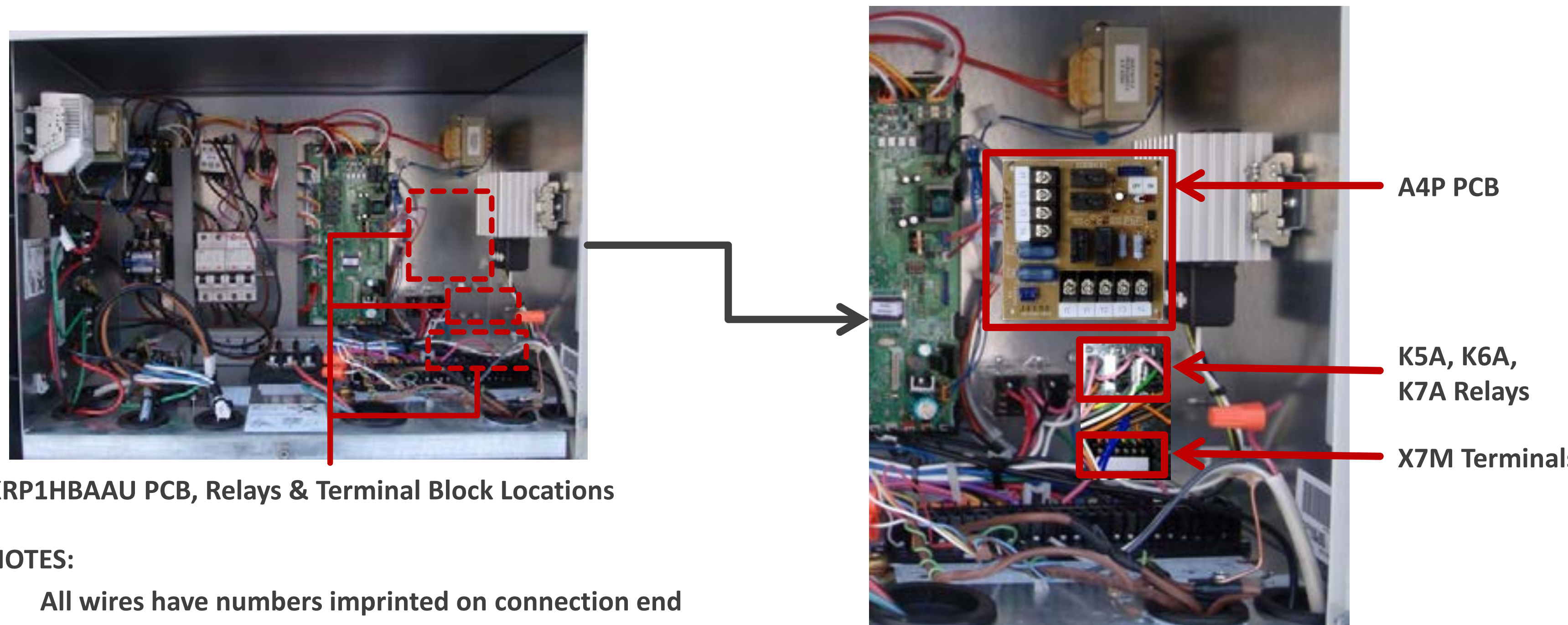
NOTES:

- All wires have numbers imprinted on connection end
- Wire X2M-26 has ¼" spade connector, cut this off to connect
- Use provided plastic clips and screws to mount PCB, relays and terminal block
- Signal from 3rd party pump station connects to X7M 5, 6 terminals
- Terminals X7M - 5, 6 have 24 VAC present, if pump station signal has voltage present use an isolation relay to protect circuit.

* **Electrical work is to comply with ALL local electrical codes**

Daikin Solar Kit (cont.)

Installing the EKRP1HB Adapter Board Kit – MonoBloc



EKRP1HBAAU PCB, Relays & Terminal Block Locations

NOTES:

- All wires have numbers imprinted on connection end
- Wire X2M-26 has ¼" spade connector, cut this off to connect
- Use provided plastic clips and screws to mount PCB, relays and terminal block
- Signal from 3rd party pump station connects to X7M 5, 6 terminals
- Terminals X7M - 5, 6 have 24 VAC present, if pump station signal has voltage present use an isolation relay to protect circuit.

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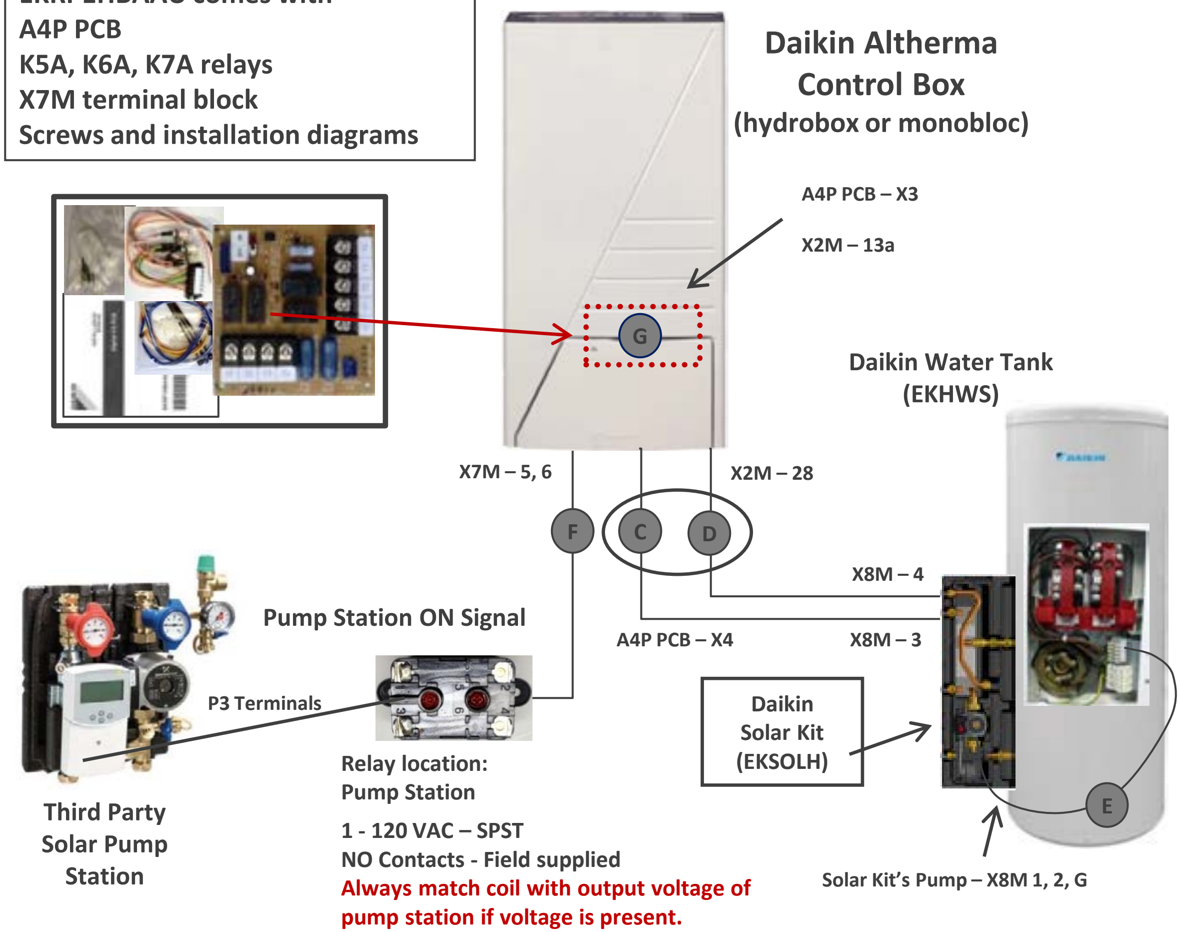
* **Electrical work is to comply with ALL local electrical codes**

Daikin Solar Kit (cont.)
Field Wiring Daikin Altherma DHW with Solar Kit

EKRP1HBAAU comes with
A4P PCB
K5A, K6A, K7A relays
X7M terminal block
Screws and installation diagrams



Typical Wire Sizes*			
	Wire #	Qty - Gauge	Note:
Solar Kit	C	1 - #12	- - -
	D	1 - #12	- - -
	E	Factory Supplied	- - -
	F	2 - #18	- - -
	G	1 - #12	- - -

Only Wiring Related to Solar Kit option is shown, see installation manual of main unit for a complete wiring diagram.

Wires: C & D can be run together*

NOTE:
When the Pump Station's pump is active (solar energy available) X7M Terminals 5 & 6 must close in Altherma. Terminals 5 & 6 have 24 VAC across them. Signal from Pump Station should be dry contacts with no voltage present.

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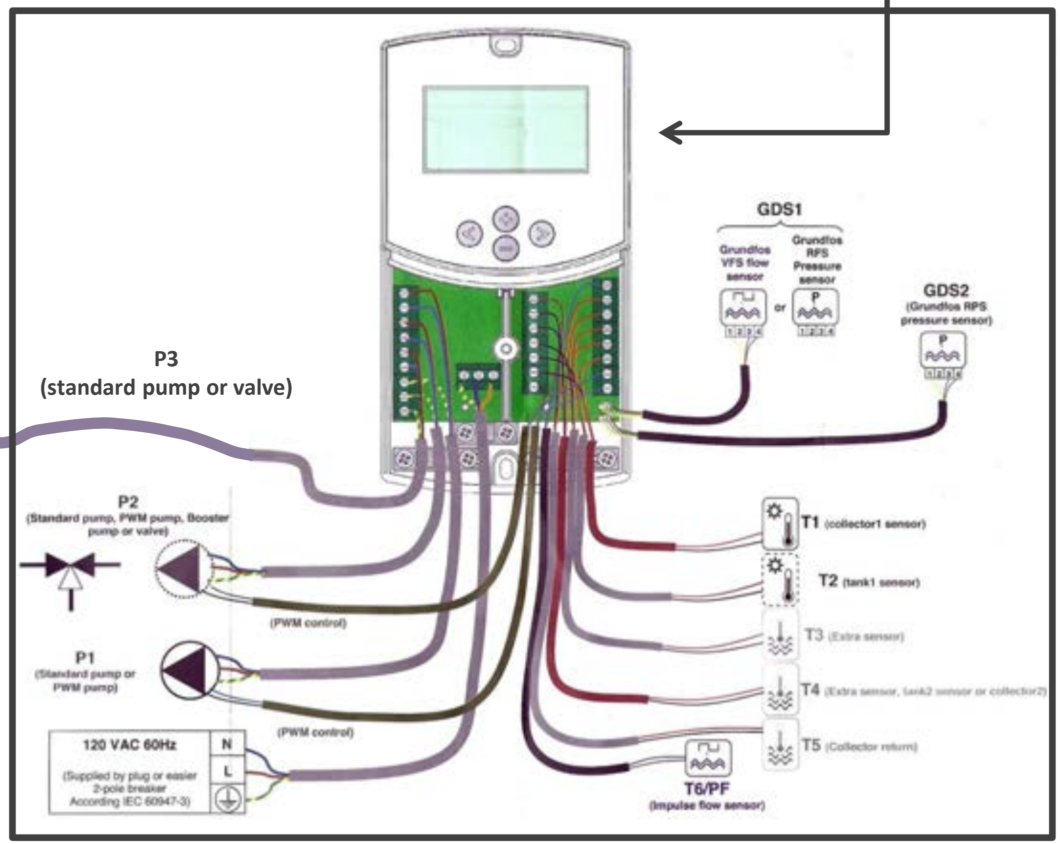
Daikin Solar Kit (cont.)
Field Wiring Daikin Altherma DHW with Solar Kit

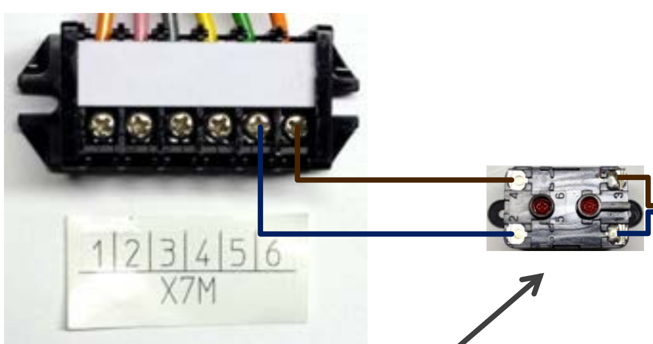
Solar Pump Station Control

- This typical solar control has a optional pump connection (P3). This connection is 125 VAC. Install a isolation relay between control and X7M terminals.

Typical Pump Station Control



Altherma X7M – 5, 6



Relay location:
Solar Pump Station

1 - 120 VAC – SPST
NO Contacts - Field supplied
Always match coil with output voltage of pump station output if voltage is present.

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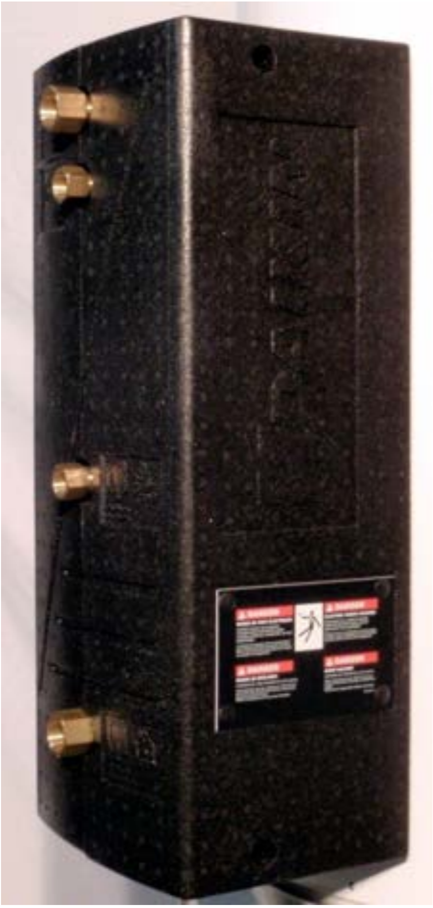
Daikin Solar Kit (cont.)

Distribution Side Water Connections (cont.)

- When installation is complete, install front cover and secure using two screws provided.
- Solar pump station setup parameters:
  - Maximum solar panel temperature: ≤ 212ºF (100ºC)
  - Maximum tank temperature: 176ºF (80Cº)
  - Minimum temperature difference between DHW tank and solar panel before starting pump station operation: ≥ 18ºF (≥ 10Cº)



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Third Party Tank Installations

DACA-DHW-KIT-1 – Domestic Hot Water Kit

To be used when connecting 3rd party indirect DHW tanks to Daikin Altherma systems.

Contents:

1. **Thermistor Assy. – Connects to X9A (Main PCB)**
2. **Booster Heater Connector Assy. K3M – Mounted to hydro section**
3. **Booster Heater Fuse/Breaker Assy. F2B – Mounted to hydro section**
4. **Tapping Screw (qty.): M4 x 8(4)**
5. **Tapping Screw (qty.): DIN7516(2)**
6. **Accessory Bag (Power Supply Sticker)**

Note: 3-way valve and BSP/NPT adapters are sold separately or can be field supplied (24VAC 100mA max.).

Third Party Tank Installations (cont.)

- Key 3rd party tank requirements:

Spec	Range Supported
Tank Volume	40, 50, 80, 119 (Gallon)
Water Temperature	Maximum of 185°F
Water Pressure	Maximum of 145PSI
Tank Material	Stainless Steel
Heat Exchange Material	Stainless Steel
Heat Exchanger	Length Min 35ft – Max 75ft
Heat Exchanger Surface	Min 15.6sqft – Max 33sqft
Tank Power Supply	208-230V / 1ph / 60Hz
Electric Heat Element	Maximum 20Amp – 208/230V

- If 3rd party tank does not have electric element (internal heat source), an alternative heat source should be sought for times when heating of DHW is outside the operation range of the heat pump.
- Consult Sales Bulletin RSS-002 for more information.

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Third Party Tank Installations (cont.)

- Included in the DHW Kit is a temperature sensor
- This sensor must be installed so it can sense the 3rd party tank's water temperature.
- If the fit of the sensor is loose within the well of the 3rd party tank, conductive compound should be used.
- The sensor should be routed from the tank back to the Altherma control box.
- The connector of the sensor plugs into the X9A socket on the main PCB within the Altherma control box.
- Split Altherma A1P PCB
- MonoBloc Altherma A11P PCB
- Do not cut or extend sensor

X9A

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Third Party Tank Installations (cont.)

- The Daikin Altherma & DHW Kit has an optional safety circuit that needs to be used or jumped out.
- This safety circuit is a 208/230 VAC circuit.
- Terminals X2M – 13, 14 in the Altherma control box can be connected through a safety if available.
- If this is not used it must be jumped out or an “AC” error will occur.

Daikin Altherma
X2M – 13,14

To tank safety if available

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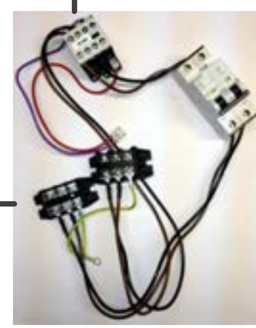
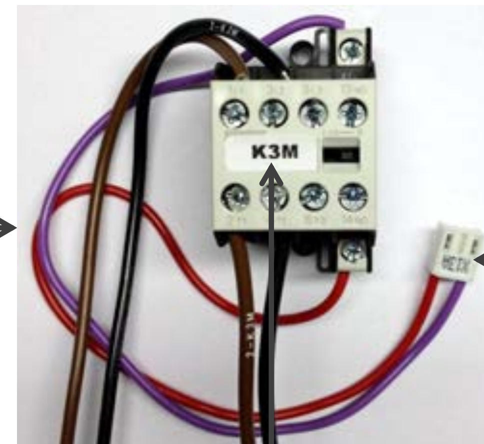
Third Party Tank Installations (cont.)

- Close up of relay harness.



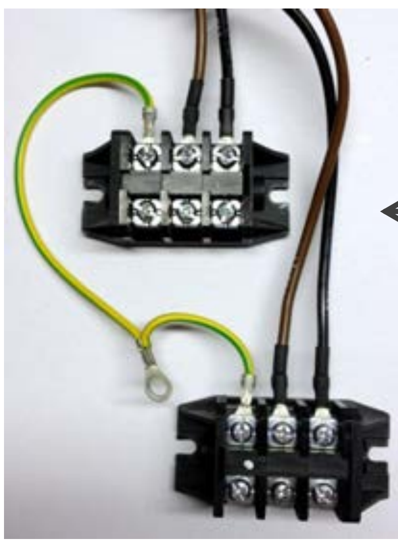
Connects to X13A Main Control Box PCB: A1P Splits/ A11P MonoBloc



K3M Relay (DPDT)

X4M Terminal Block (contacts)

X3M Terminal Block (contacts)



F2B Breaker
DPDT Switch
208/240V 20Amp Max.

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* <u>Electrical work is to comply with ALL local electrical codes</u>

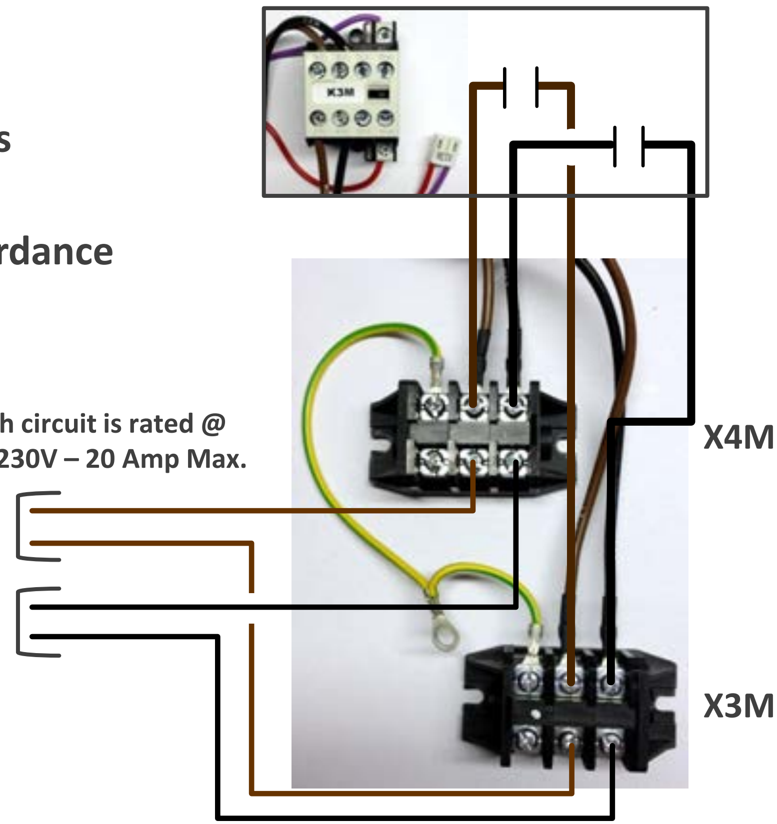
Third Party Tank Installations (cont.)

Set up and control of K3M relay and contacts.

- X3M/X4M terminals can control pump, controls or other heat source.
- Each circuit is rated at 208/230V – 20 Amp Max.
- Control of these contacts are done by field settings through the user interface.
- Wire sizing and protection should be done in accordance to local electrical codes

2 sets of normally open contacts (K3M Relay) close when the Altherma DHW mode is active.

Each circuit is rated @ 208/230V – 20 Amp Max.

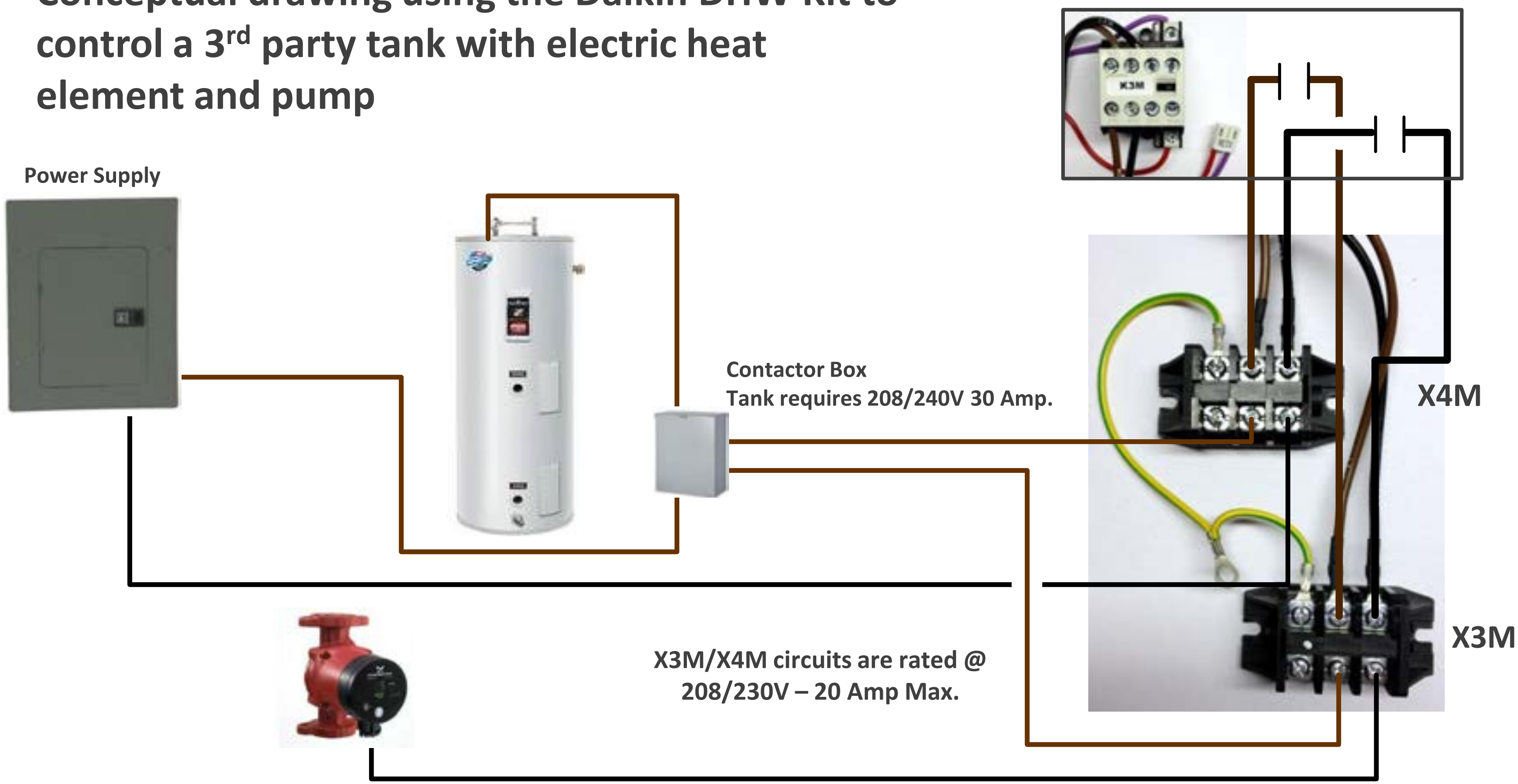


* Electrical work is to comply with ALL local electrical codes

Third Party Tank Installations (cont.)

- **Conceptual drawing using the Daikin DHW Kit to control a 3rd party tank with electric heat element and pump**

2 sets of normally open contacts (K3M Relay) close when the Altherma DHW mode is active.



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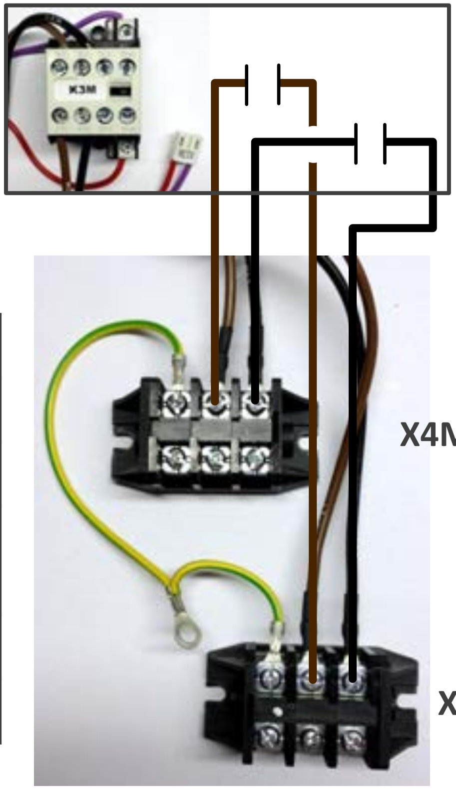
* **Electrical work is to comply with ALL local electrical codes**

Third Party Tank Installations (cont.)

- X3M/X4M contacts are controlled by Field Settings FS [7-00] & [7-01]
- Contacts open – Tank set point plus value of [7-00]
- Contacts close – Tank set point plus [7-00] minus [7-01] value

Recommended DHW Kit Field Settings		
Field Settings	Value	Description
2-00	0 (OFF)	Turns Disinfection Function OFF
4-03	1	Allows X3M and X4M to operate based on 7-00 and 7-01
7-00	User Defined	X3M/X4M contact step length
7-01	User Defined	Hysteresis value for 7-00

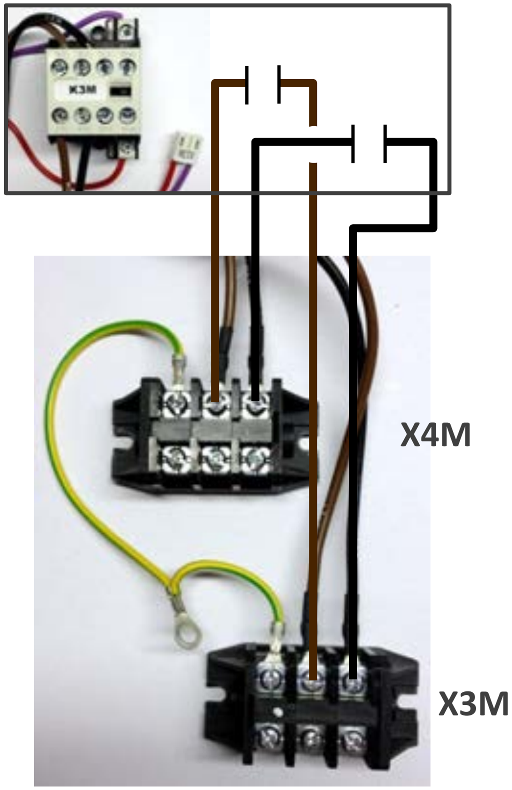


* Electrical work is to comply with ALL local electrical codes

Third Party Tank Installations (cont.)

- Contacts open – Tank set point plus value of [7-00]
- Contacts close – Tank set point plus [7-00] minus [7-01] value
- Example:
  - Tank set point = 120ºF
  - [7-00] = 1.8ºF
  - [7-01] = 3.6ºF
  - Contacts open @ 121.8ºF
  - Contacts close @ 118.2ºF

Field Settings	Value	Range	Unit
7-00	User Defined	0-7.2ºF (0-4ºC)	1.8ºF (1ºC)
7-01	User Defined	3.6-72ºF (2-40ºC)	1.8ºF (1ºC)



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Third Party Tank Installations (cont.)

Space Heating Priority

- Space Heating Priority allows the full capacity of the heat pump to be used for space heating.

Set Point Correction for DHW Temperature

- Daikin DHW tanks use this due to it's heating element being located above the heat exchanger. It allows the tanks to still maintain its full capacity since now the heat source is in the middle of the tank.
- 3rd Party tank applications might not need this feature and the value can be set to 0^{o}F to cancel it out.

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Third Party Tank Installations (cont.)

Space Heating Priority and its effect on DHW Heating Mode

- When Space Heating Priority Status Field Setting (FS) [5-02] is set to 1(ON), if the outdoor temperature drops below FS [5-03] value the heat pump will not be available for DHW heating. DHW heating will only be heated by the heat source connected to the X3M/X4M contacts. X3M/X4M contacts controlled by FS [7-00] & [7-01]
- Set Point Correction for DHW Temperature – When Space Heating Priority status is ON and active (outdoor temp below FS [5-03]) X4M/X3M contacts will remain ON until DHW sensor overshoots set point by the value of FS [5-04]

Field Settings	Description	Value	Range	Unit
5-02	Space Heating Priority Status	0(OFF)/1(ON)	0/1	---
5-03	Space Heating Priority Temperature	User Defined	5~68°F(-15~20°C)	1.8°F (1°C)
5-04	Set Point Correction for DHW Temperature	User Defined	0~36°F(0~20°C)	1.8°F (1°C)

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Third Party Tank Installations (cont.)

Set Point Correction for DHW Temperature

- Example:
  - Tank Set Point 120°F
  - [5-02] = 1(ON)
  - [5-03] = 15°F
  - [5-04] = 18°F
- When outdoor temp drops below 15°F, DHW mode will only engage X3M/X4M contacts.
- Heat Pump will only be available for space heating.
- X3M/X4M contacts will not open until tank temperature reaches tank set point plus FS [5-04]
  - 120°F + 18°F = Contacts Open @ 138°F

Field Settings	Description	Value	Range	Unit
5-02	Space Heating Priority Status	0(OFF)/1(ON)	0/1	---
5-03	Space Heating Priority Temperature	User Defined	5~68°F(-15~20°C)	1.8°F (1°C)
5-04	Set Point Correction for DHW Temperature	User Defined	0~36°F(0~20°C)	1.8°F (1°C)

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Next Steps…

- Use the startup and configuration section of the DHW Tank and Hydrobox or MonoBloc installation manual to configure and start the equipment.

- Or use the Daikin Altherma Quick Startup & Reference Guide

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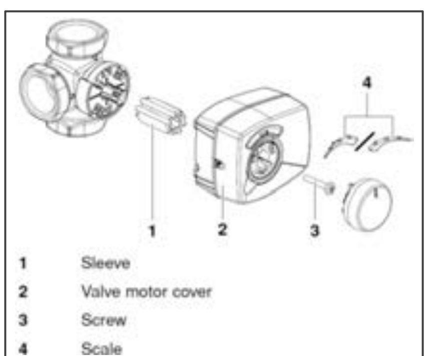
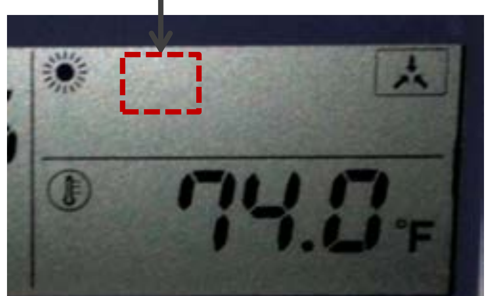
3-way Valve Re-sync

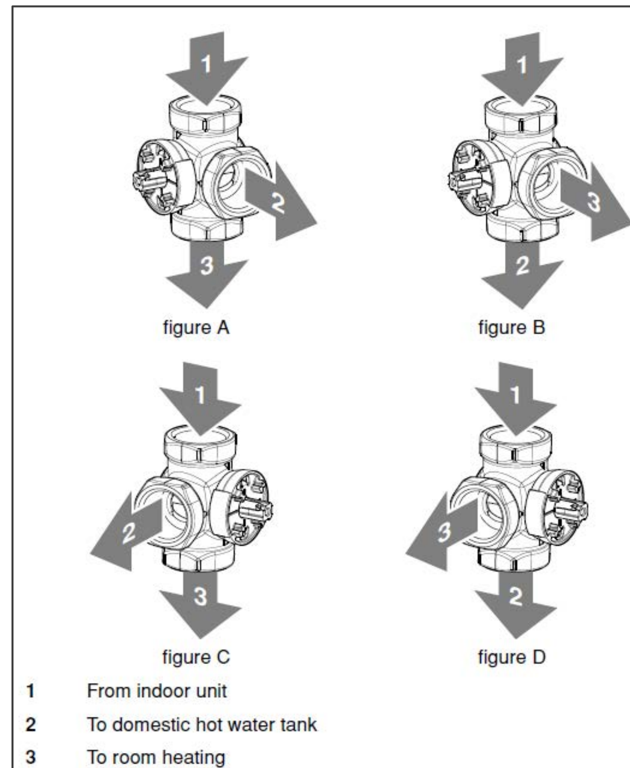
3-way valve Re-sync (DHW Tank Option)

If 3-way valve is installed and has been operated, but is not in sync due to installation error use the following steps to properly sync motor and valve body with installation.

1. **Turn OFF DHW mode and make sure the  icon is not in user interface display.**
2. **Once 3-way valve motor has stopped rotating, the knob indicator will be in a 10 or 2 o'clock position. Turn OFF power to condenser.**
3. **Confirm 3-way valve install configuration using images on right, for more information see page 6 of DHW Tank Installation Manual.**







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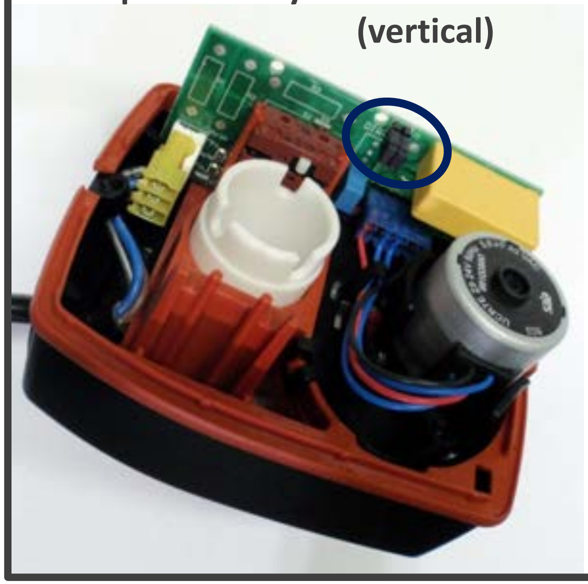
3-way Valve Re-sync (cont.)

3-way valve Re-sync (DHW Tank Option) (cont.)

4. Open motor head and confirm jumper position using image on right.

Jumpers factory set for B & C (vertical)



Remove and rotate ¼ turn

Reinstall as shown for A & D (horizontal)

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3-way Valve Re-sync (cont.)

3-way valve Re-sync (DHW Tank Option) (cont.)

5. Open motor head and confirm jumper position using image on right.

Motor Stack Pieces

Take note of tabs on white barrel	Place orange ring on barrel, be sure to line up tabs	Install red and green pieces, green tab should be center of slot
		

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3-way Valve Re-sync (cont.)

3-way valve Re-sync (DHW Tank Option) (cont.)

6. Replace cover and screw

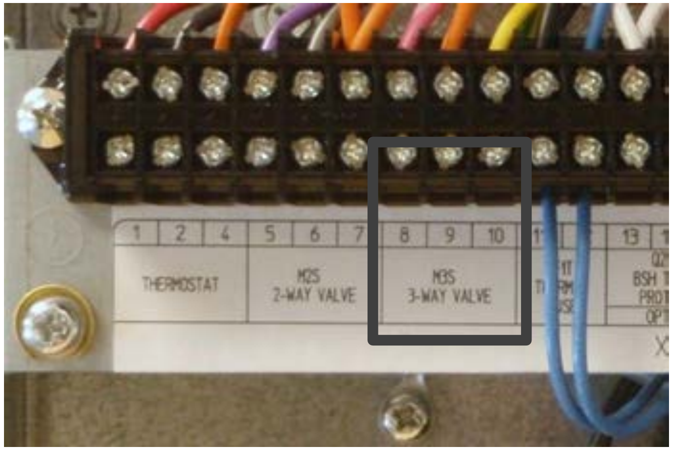
7. Confirm wiring

For A & B go to page 67, for C & D go to 68

3-way Valve	Altherma Control Box – X2M
Brown wire	Terminal 8
Blue wire	Terminal 9
Black wire	Terminal 10

Place cover on motor head and reinstall cover screw

X2M – Terminal Block



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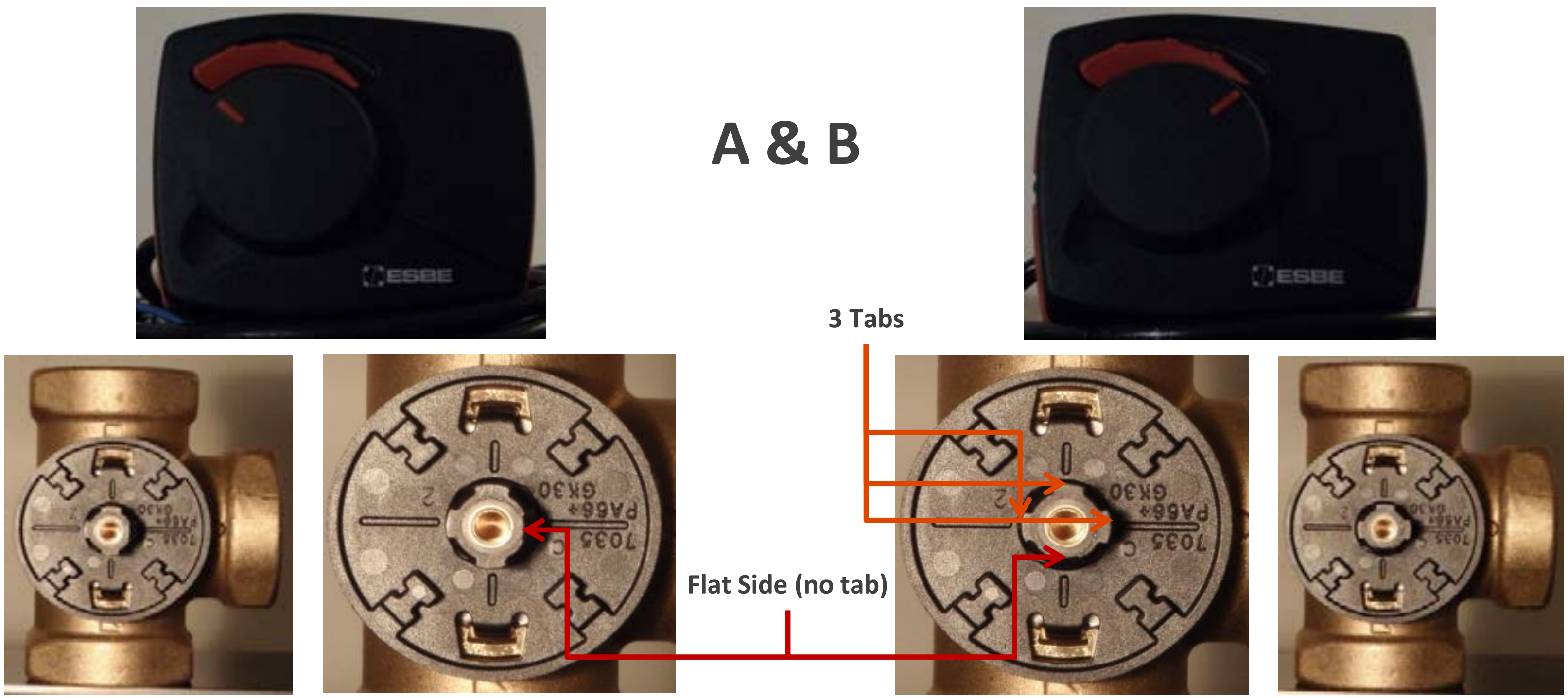
3-way Valve Re-sync (cont.)

3-way valve (DHW Tank Option) (cont.)

8. For both A & B configurations reset stem as shown below and reassemble, C & D proceed to next page
9. Once reassembly is complete turn back ON power, if when power was turned ON the valve motor operated, wait for valve to stop rotating, turn condenser OFF and repeat step 8.

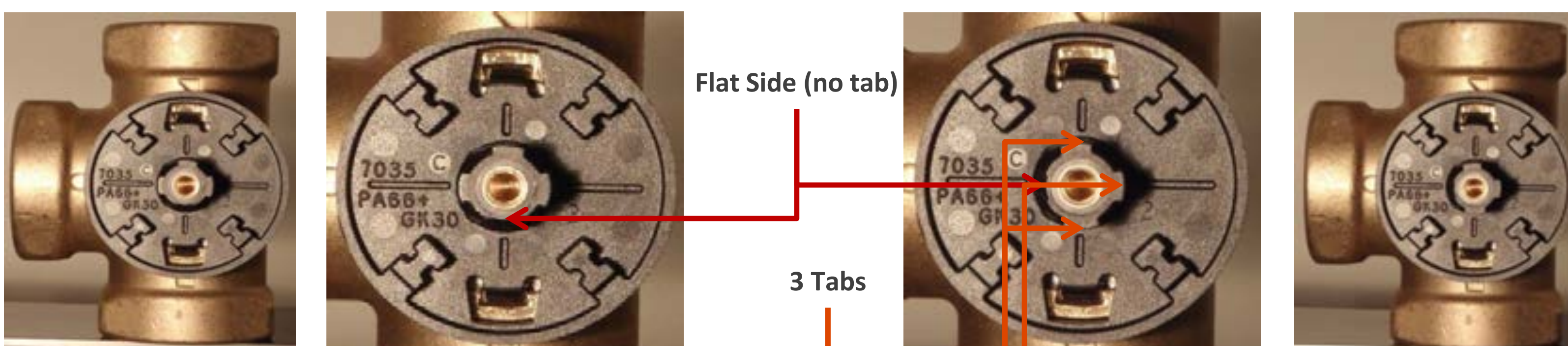


3-way Valve Re-sync (end)

3-way valve (DHW Tank Option) (cont.)

8. For both C & D configurations reset stem as shown below and reassemble
9. Once reassembly is complete turn back ON power, if when power was turned ON the valve motor operated, wait for valve to stop rotating, turn condenser OFF and repeat step 8.

C & D



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3-way Valve Resync

3-way valve (DHW Tank Option) (cont.)

Now the valve can be operated normally.

For manual operation pull knob out to expose red ring, when red ring is exposed the valve's motor is not engaged and can be operated manually. To reengage motor, rotate and push until knob snaps back into place.

When the knob is pressed fully into the motor, the knob cannot be operated by hand. Only the motor will control valve's operation

If the knob's red ring is exposed valve can be operated manually.

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absolute comfort

For more detailed information check Daikin’s Engineering, Installation, Operation and Service manuals.
Available at www.daikinac.com

Thank You

Daikin Altherma™



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Hydronic Fan Coil Unit Installation

Hydronic Fan Coil Unit - Overview

- For Hydro-Air or traditional forced air applications, the high efficiency hydronic fan coil unit can be used with Daikin Altherma to meet your comfort needs
- The Hydronic Fan Coil Unit has been engineered to provide an effective solution in combination with the “Low Temperature” characteristic of the system.

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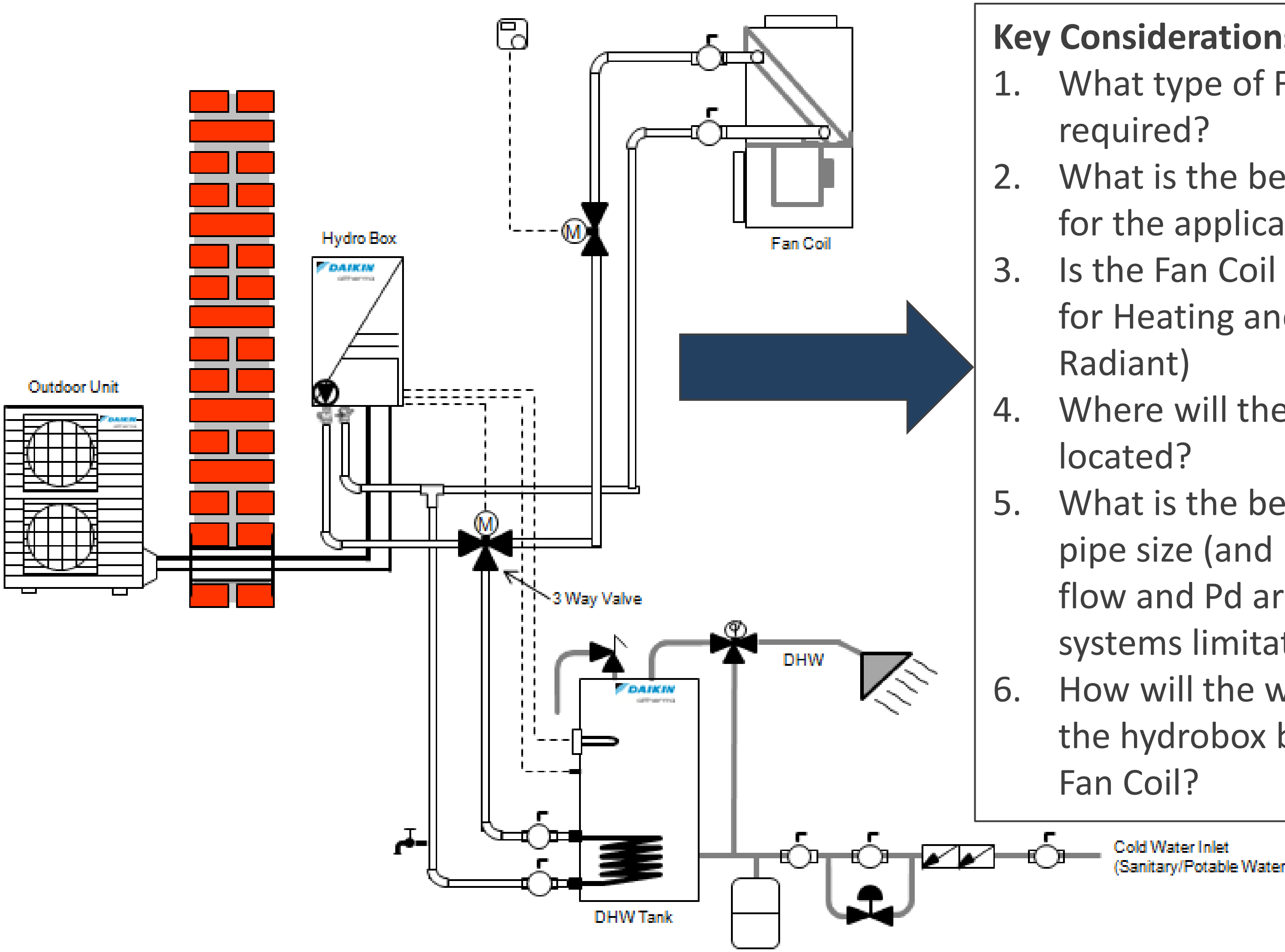
Hydronic Fan Coil Unit – Typical System Schematic



Key Considerations

1. What type of Fan Coil is required?
2. What is the best size of Fan Coil for the application?
3. Is the Fan Coil the ONLY source for Heating and Cooling (i.e. No Radiant)
4. Where will the Fan Coil be located?
5. What is the best suited water pipe size (and material) to ensure flow and Pd are within the systems limitations?
6. How will the water piping from the hydrobox be routed to the Fan Coil?

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Hydronic Fan Coil Unit – Nomenclature

E FW T 024 A E VL U -00

E = Altherma Equipment

FW = Hydronic Fan Coil Unit

T = Ducted (Upflow, Horizontal L & R)

Nominal Capacity (kBtu/hr)

024 = 24,000 Btu/hr
036 = 36,000 Btu/hr
048 = 48,000 Btu/hr
060 = 60,000 Btu/hr

A = Model Series

E = Motor Configuration

E = ECM Fan Motor
P = PSC Fan Motor (future)

VL = 120V / 1 / 60Hz
VJ = 208-230V / 1Ph / 60Hz

U = UL Certified

-00 = Factory Installed Electric Heat

00 = No Electric Heat
05 = 5kW Electric Heat
10 = 10kW Electric Heat
15 = 15kW Electric Heat
20 = 20kW Electric Heat
25 = 25kW Electric Heat

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Hydronic Fan Coil Unit – ECM Fan Motor Line

120V Model

No Electric Heat Options

Capacity	Daikin Model Number
18MBH	EFWT024AEVLU (600 CFM)
24MBH	EFWT024AEVLU (800 CFM)
30MBH	EFWT036AEVLU (1000 CFM)
36MBH	EFWT036AEVLU (1200 CFM)
48MBH	EFWT048AEVLU (1600 CFM)
60MBH	EFWT060AEVLU (1825 CFM)

208-230V Model

Various Electric Heat Options (Factory Installed)

Capacity	Daikin Model Number	Electric Heat
18MBH	EFWT024AEVJU (600 CFM)	-00
		-05
		-10
24MBH	EFWT024AEVJU (800 CFM)	-00
		-05
		-10
30MBH	EFWT036AEVJU (1000 CFM)	-00
		-05
		-10
		-15
36MBH	EFWT036AEVJU (1200 CFM)	-00
		-05
		-10
		-15
48MBH	EFWT048AEVJU (1600 CFM)	-00
		-15
		-20
		-25
60MBH	EFWT060AEVJU (1825 CFM)	-00
		-15
		-20
		-25

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Hydronic Fan Coil Unit – ECM Specifications (120V)

Capacity	018	024	030	036	048	054
Model Number (No Electric Heat Options)	**EFWT024AEVLU****	**EFWT024AEVLU**	**EFWT036AEVLU****	**EFWT036AEVLU**	**EFWT048AEVLU**	**EFWT060AEVLU**
Cooling Performance:						
Nominal Capacity (Btu/hr)	19,100	22,600	28,600	32,000	42,700	49,600
Nominal Sensible Capacity (Btu/hr)	14,200	17,700	22,400	25,800	34,700	39,500
EWT Range (°F)	40 - 50F					
Nominal Flow Rate (GPM)	4.5	5.0	6.0	6.0	8.0	10.0
Nominal Pressure drop (Ft Hd)	5.5	7.7	4.8	5.5	5.4	7.9
Heating Performance:						
Nominal Capacity (Btu/hr)	19,300	25,000	31,900	34,800	50,200	57,000
EWT Range (°F)	100 - 125 F					
Nominal Flow Rate (GPM)	3.0	4.5	4.5	4.5	8.0	10.0
Nominal Pressure drop (Ft Hd)	2.5	5.5	3.0	3.0	5.4	7.9
Airflow Rate:						
Nominal (CFM)	600	800	1050	1200	1600	1825
Total External Static Pressure (WG")	0.3" WG Std, 0.5" WG Max					
Blower Speed setting	"C" SETTING (in field)	"A" FACTORY SETTING	"B" SETTING (in field)	"A" FACTORY SETTING	"A" FACTORY SETTING	"A" FACTORY SETTING
Motor rating (HP)	1/3 HP		1/2 HP		3/4 HP	1 HP
Airflow arrangement	Upflow, Horizontal L, Horizontal R (Possible)					
Electrical Data (No Electric Heat Option):						
Power supply	120V / 1 / 60Hz					
Minimum Circuit Amps (MCA)	6	6	10	10	14	15
Maximum overcurent protection (MOP)	15	15	15	15	15	15
Physical Data:						
Dimension (H x W x D)	40 x 20 x 20		40 x 23 x 20		48 x 21-1/4 x 28	
Weight (lbs)	115		170		230	290
insulation type / R-Rating	1/2" JM TUF-SKIN					
Installation Clearances	U.L. LISTED FOR INSTALLATION WITH ZERO INCHES CLEARANCE TO COMBUSTABLE MATERIALS					
Connection type						
Inlet / Outlet Connections (Inch)	3/4	3/4	3/4	3/4	1	1
Connection Type	Sweat	Sweat	Sweat	Sweat	Sweat	Sweat
Feature:						
Air Filter (MERV 8 Throwaway)	18 x 20 x 1		20 x 22 x 1		20 x 25 x 1	

Notes:

1. Cooling Capacity is based on 50°F Entering Water Temp and 80°F DB/67°F WB Entering Air Conditions.
2. Heating Capacity is based on 110°F Entering Water Temp and 70°F DB Entering Air Conditions.
3. Refer to detailed capacity tables for further information pertaining to the entire entering water temperature range and for flow rates and pressure drop.

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Hydronic Fan Coil Unit – ECM Specifications (230V)

Capacity	018	024	030	036	048	054
Model Number (With Electric Heat Options)	EFWT024AEVJU**	EFWT024AEVJU	EFWT036AEVJU**	EFWT036AEVJU	EFWT048AEVJU	EFWT060AEVJU
Cooling Performance:						
Nominal Capacity (Btu/hr)	19,100	22,600	28,600	32,000	42,700	49,600
Nominal Sensible Capacity (Btu/hr)	14,200	17,700	22,400	25,800	34,700	39,500
EWT Range (°F)	40 - 50F					
Nominal Flow Rate (GPM)	4.5	5.0	6.0	6.0	8.0	10.0
Nominal Pressure drop (Ft Hd)	5.5	7.7	4.8	5.5	5.4	7.9
Heating Performance:						
Nominal Capacity (Btu/hr)	19,300	25,000	31,900	34,800	50,200	57,000
EWT Range (°F)	100 - 125 F					
Nominal Flow Rate (GPM)	3.0	4.5	4.5	4.5	8.0	10.0
Nominal Pressure drop (Ft Hd)	2.5	5.5	3.0	3.0	5.4	7.9
Airflow Rate:						
Nominal (CFM)	600	800	1050	1200	1600	1825
Total External Static Pressure (WG")	0.3" WG Std, 0.5" WG Max					
Blower Speed setting	“C" SETTING (in field)	"A" FACTORY SETTING	“B“ SETTING (in field)	"A" FACTORY SETTING	"A" FACTORY SETTING	"A" FACTORY SETTING
Motor rating (HP)	1/3 HP		1/2 HP		3/4 HP	1 HP
Airflow arrangement	Upflow, Horizontal L, Horizontal R (Possible)					
Electrical Data (With Electric Heat Options):						
Power supply	208-230V / 1 / 60Hz					
Minimum Circuit Amps (MCA)	3	3	4	4	6	9
Maximum overcurent protection (MOP)	15	15	15	15	15	15
Electrical Heater Options 5 to 25kW	5kW, 10kW	5kW, 10kW	5kW, 10kW, 15kW	5kW, 10kW, 15kW	15kW, 20kW, 25kW	15kW, 20kW, 25kW
Electric Heat MCA / MOP Values	REFER TO ELECTRIC HEAT OPTIONS SUMMARY FOR ELECTRICAL SPECIFICATIONS					
Electrical Heat Integral Disconnect	FACTORY INSTALLED SERVICE SWITCH OVER 10KW (NO DISCONNECT)					
Physical Data:						
Dimension (H x W x D)	40 x 20 x 20		40 x 23 x 20		48 x 21-1/4 x 28	
Weight (lbs)	115		170		230	290
insulation type / R-Rating	1/2" JM TUF-SKIN					
Installation Clearances	U.L. LISTED FOR INSTALLATION WITH ZERO INCHES CLEARANCE TO COMBUSTABLE MATERIALS					
Connection type						
Inlet / Outlet Connections (Inch)	3/4	3/4	3/4	3/4	1	1
Connection Type	Sweat	Sweat	Sweat	Sweat	Sweat	Sweat
Feature:						
Air Filter (MERV 8 Throwaway)	18 x 20 x 1		20 x 22 x 1		20 x 25 x 1	

Notes:
1. Cooling Capacity is based on 50°F Entering Water Temp and 80°F DB/67°F WB Entering Air Conditions.
2. Heating Capacity is based on 110°F Entering Water Temp and 70°F DB Entering Air Conditions.
3. Refer to detailed capacity tables for further information pertaining to the entire entering water temperature range and for flow rates and pressure drop.

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Hydronic Fan Coil Unit – PSC Fan Motor Line

- Reduced cost PSC Fan Motor option for price sensitive applications or where ECM advantages are not required
  - Single A-Coil configured for Hydronic Heating and Cooling Operation
  - Flexible Installation with Up-flow, Horizontal L and Horizontal R configuration possible
  - 3-Speed Blower for improved air flow / temperature control
  - Factory Installed MERV 8 Filter for cleaner indoor air (throwaway type)
  - Minimal Cabinet Dimensions with 1/2" TUF-SKIN Cabinet Insulation
  - 5yr Parts Warranty

120V Model

No Electric Heat Options

Capacity	Daikin Model Number
18MBH	EFWT024APVLU (610 CFM)
24MBH	EFWT024APVLU (750 CFM)
30MBH	EFWT036APVLU (960 CFM)
36MBH	EFWT036APVLU (1185 CFM)
48MBH	EFWT048APVLU (1540 CFM)
60MBH	EFWT060APVLU (1825 CFM)

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Hydronic Fan Coil Unit – PSC Specifications (120V)

Capacity	018	024	030	036	048	054
Model Number (No Electric Heat Options)	EFWT024APVLU**	EFWT024APVLU	EFWT036APVLU**	EFWT036APVLU	EFWT048APVLU	EFWT060APVLU
Cooling Performance:						
Nominal Capacity (Btu/hr)	19,100	22,600	28,600	32,000	42,700	49,600
Nominal Sensible Capacity (Btu/hr)	14,200	17,700	22,400	25,800	34,700	39,500
EWT Range (°F)	40 - 50F					
Nominal Flow Rate (GPM)	4.5	5.0	6.0	6.0	8.0	10.0
Nominal Pressure drop (Ft Hd)	5.5	7.7	4.8	5.5	5.4	7.9
Heating Performance:						
Nominal Capacity (Btu/hr)	19,300	25,000	31,900	34,800	50,200	57,000
EWT Range (°F)	100 - 125 F					
Nominal Flow Rate (GPM)	3.0	4.5	4.5	4.5	8.0	10.0
Nominal Pressure drop (Ft Hd)	2.5	5.5	3.0	3.0	5.4	7.9
Airflow Rate:						
Nominal (CFM)	600	800	1000	1200	1600	1825
Total External Static Pressure (WG")	0.3" WG Std, 0.5" WG Max					
Blower Speed setting	Med-High Setting	High Speed Setting	Med-High Setting	High Speed Setting	High Speed Setting	High Speed Setting
Motor rating (HP)	1/5 HP		1/3 HP		1/2 HP	3/4 HP
Airflow arrangement	Upflow, Horizontal L, Horizontal R (Possible)					
Electrical Data (No Electric Heat Option):						
Power supply	120V / 1 / 60Hz					
Minimum Circuit Amps (MCA)	3.75	3.75	7.5	7.5	10	13.1
Maximum overcurent protection (MOP)	15	15	15	15	15	15
Physical Data:						
Dimension (H x W x D)	40 x 20 x 20		40 x 23 x 20		48 x 21-1/4 x 28	
Weight (lbs)	115		170		230	290
insulation type / R-Rating	1/2" JM TUF-SKIN					
Installation Clearances	U.L. LISTED FOR INSTALLATION WITH ZERO INCHES CLEARANCE TO COMBUSTABLE MATERIALS					
Connection type						
Inlet / Outlet Connections (Inch)	3/4	3/4	3/4	3/4	1	1
Connection Type	Sweat	Sweat	Sweat	Sweat	Sweat	Sweat
Feature:						
Air Filter (MERV 8 Throwaway)	18 x 20 x 1		20 x 22 x 1		20 x 25 x 1	

Notes:
1. Cooling Capacity is based on 50°F Entering Water Temp and 80°F DB/67°F WB Entering Air Conditions.
2. Heating Capacity is based on 110°F Entering Water Temp and 70°F DB Entering Air Conditions.
3. Refer to detailed capacity tables for further information pertaining to the entire entering water temperature range and for flow rates and pressure drop.

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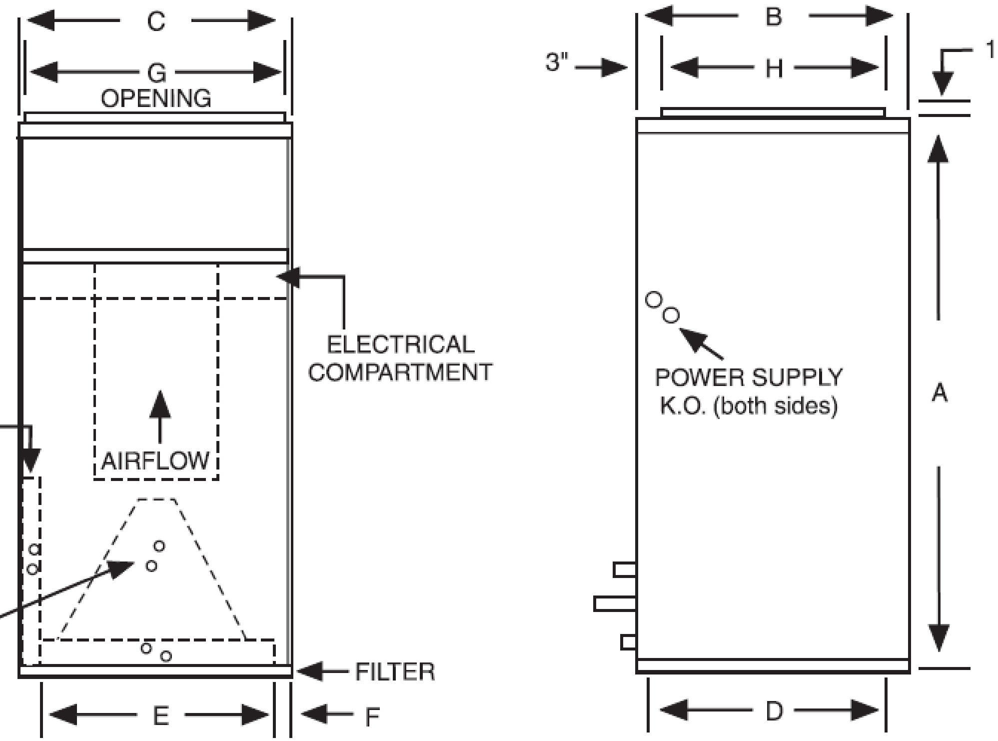
Hydronic Fan Coil Unit – Dimensions

Horizontal convertible Drain Pan

Coil Connections
3/4” Nominal, Sweat (18,24,30,36)
1” Nominal, Sweat (48, 60)



Model	A	B	C	D	E	F	G	H	Filter
EFWT024 (Including 018 Configuration)	40	20	20	18-1/2	16	2	18	16	18 x 20 x 1
EFWT036 (Including 030 Configuration)	40	23	20	21-1/2	16	2	18	17	20 x 22 x 1
EFWT048	48	28	21-1/4	26-1/4	17	2	19-1/4	18-1/4	20 x 25 x 1
EFWT060	48	28	21-1/4	26-1/4	17	2	19-1/4	18-1/4	20 x 25 x 1

Hydronic Fan Coil Unit – Clearances

If installed up-flow/vertically

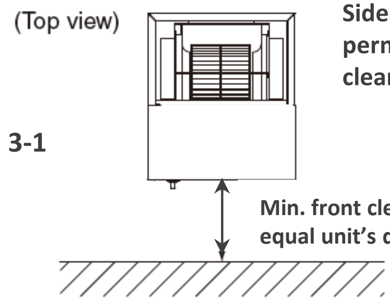


Fig. 3-1

Sides/back are permitted for 0” clearance

Min. front clearance should equal unit’s depth

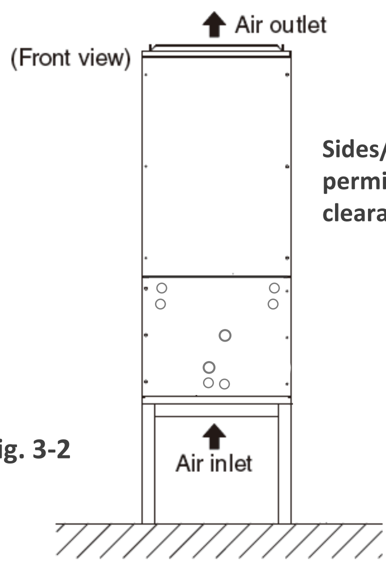
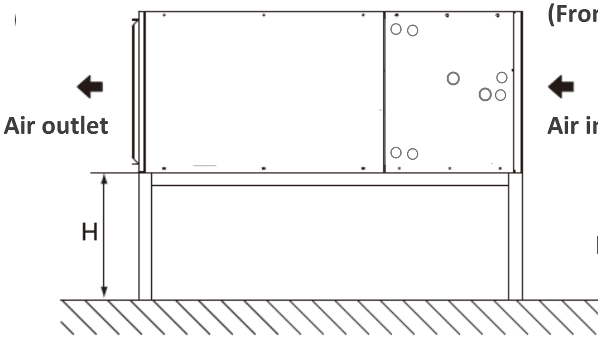


Fig. 3-2

Sides/back are permitted for 0” clearance

If installed horizontally **(horizontal left shown)**

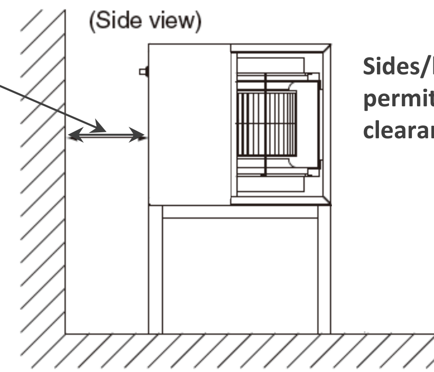


(Front view)

Air outlet

Air inlet

Fig. 3-3



Min. front clearance should equal unit’s depth

Sides/back are permitted for 0” clearance

Fig. 3-4

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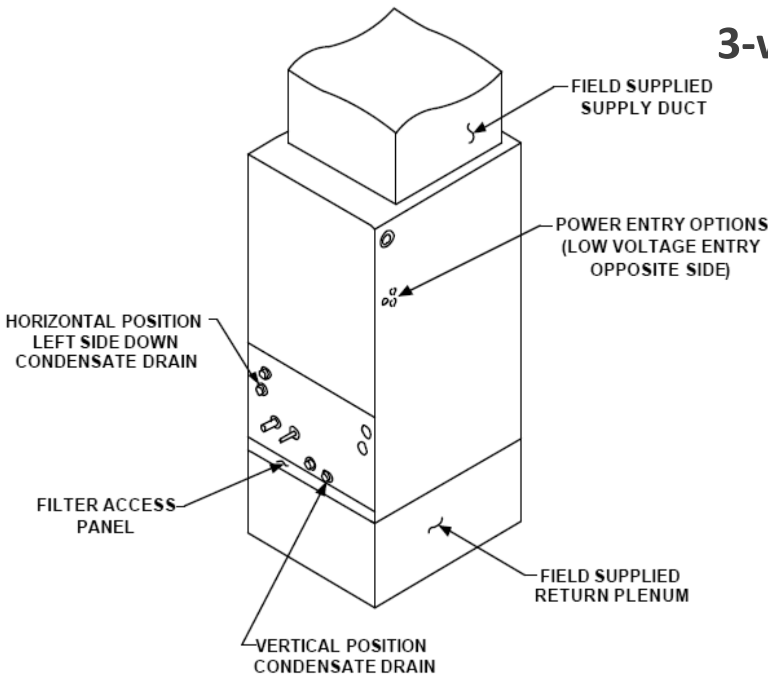
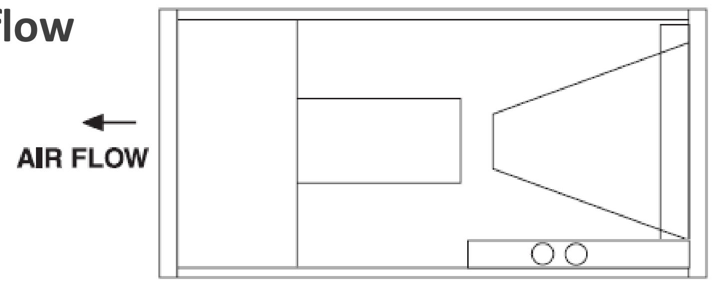
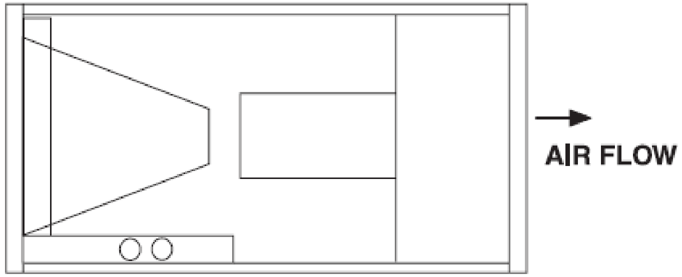
Hydronic Fan Coil Unit – Field Configurable



3-way Airflow



(STANDARD HORIZONTAL POSITION)



(ALTERNATE HORIZONTAL POSITION)
(FIELD-CONVERTIBLE)

Horizontal Right Conversion

To convert unit for horizontal right side down instructions.

1. Remove blower and coil panels.
2. Remove angle bracket holding top of horizontal drain pan.
3. Remove horizontal drain pan and A-coil assembly.
4. Flip horizontal drain pan over to right side and reinstall horizontal drain pan and A-coil into cabinet.
5. Secure forward edge of horizontal drain pan with angle bracket.
6. Replace blower and coil panels.
7. Unit should be level in such a way that there is a slight slope towards the condensate drain nipple to assure positive drainage.

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Hydronic Fan Coil Unit – Water Connections

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Bottom Section of Fan Coil Unit

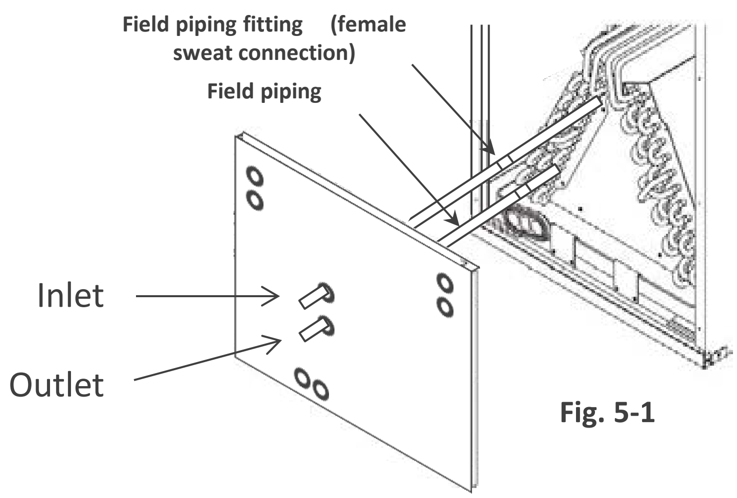

Fig. 5-1

Fan Coil	Water IN/OUT
EFWT018 EFWT024	3/4" Nominal
EFWT030 EFWT036	3/4" Nominal
EFWT048	1" Nominal
EFWT060	1" Nominal

Water pipe sizing to unit will be determined by unit capacity, application and distribution piping.

Hydronic Fan Coil Unit – Drain Connections

Bottom Section of Fan Coil Unit

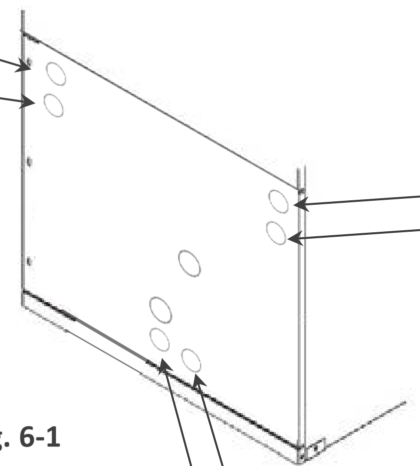

Fig. 6-1

- Perform drain work so that the unit is drained thoroughly. (Be sure to insulate the following 2 locations since condensation may cause water leakage.)
- The drain pan has connections for a primary and secondary drain.
- Use 3/4 piping for drain piping connections.
- Drain must have trap installed, drain is on negative side of blower
- Keep piping runs short with a downward slope of at least 1/100 so that there is no air bank.

Drain size connections

- Up-flow/vertical – 3/4” female NPT connection
- Horizontal right & left – 3/4” male NPT connection

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Hydronic Fan Coil Unit – Electrical Connections

Consult the fan coils Installation Guide for electrical specifications

120 ECM

Units	Power supply				Fan motor (ECM)	
Model	VAC	Hz	MOP	MCA	HP	FLA
EFWT018AEVLU EFWT024AEVLU	120	60	15	6	1/3	4.8
EFWT030AEVLU EFWT036AEVLU				10	1/2	7.3
EFWT048AEVLU				14	3/4	10.5
EFWT060AEVLU				15	1	11.5

208/240 ECM

Units	Power supply				Fan motor (ECM)	
Model	VAC	Hz	MOP	MCA	HP	FLA
EFWT018AEVJU EFWT024AEVJU	208/240	60	15	6	1/3	1.9
EFWT030AEVJU EFWT036AEVJU				10	1/2	2.8
EFWT048AEVJU				14	3/4	4.7
EFWT060AEVJU				15	1	7.1

120 PSC

Units	Power supply				Fan motor (PSC)	
Model	VAC	Hz	MOP	MCA	HP	FLA
EFWT018APVLU EFWT024APVLU	120	60	15	3.75	1/5	3.0
EFWT030APVLU EFWT036APVLU				7.5	1/3	6.0
EFWT048APVLU				10	1/2	8.0
EFWT060APVLU				13.12	3/4	10.5

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Hydronic Fan Coil Unit – Electrical Connections

Consult the fan coils Installation Guide for electrical specifications

These tables show the electrical characteristics for fan coils with the factory installed electric heat package option.

Model	kW	Circuits	FLA 208/240	MCA 208/240	MOP 208/240
EFWT018AEVJU EFWT024AEVJU	0kW	0	2.0(240)	- - -	15/15
	5kW	1	20/23	25/28	25/30
	10kW	1	38/44	47/54	50/60
EFWT030AEVJU EFWT036AEVJU	0kW	0	2.5(240)	- - -	15/15
	10kW	1	39/45	49/56	50/60
	15kW	1	39/45	49/56	50/60
		2	18/21	23/26	25/30

Model	kW	Circuits	FLA 208/240	MCA 208/240	MOP 208/240
EFWT048AEVJU	0kW	0	3.5(240)	- - -	15/15
	15kW	1	42/48	53/60	50/60
		2	18/21	23/27	25/30
	20kW	1	40/46	50/57	50/60
		2	36/42	46/53	50/60
	25kW	1	40/46	50/57	50/60
		2	36/42	46/53	50/60
		3	18/21	23/27	25/30
EFWT060AEVJU	0kW	0	5.0(240)	- - -	15/15
	15kW	1	42/48	53/60	50/60
		2	18/21	23/27	25/30
	20kW	1	42/48	53/60	50/60
		2	36/42	46/53	50/60
	25kW	1	42/48	53/60	50/60
		2	36/42	46/53	50/60
		3	1821	23/27	25/30

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Hydronic Fan Coil Unit – Control Wiring Example

All Fan Coil Unit Models

A programmable thermostat with the option for controlling the fan during Heating operation will be needed unless other provisions have been made for turning on the fan during Stage 1 of Heating (Altherma thermal ON) The thermostat will need to be set up to control the fan during Heating operation.

Refer to installation instructions for further examples and details

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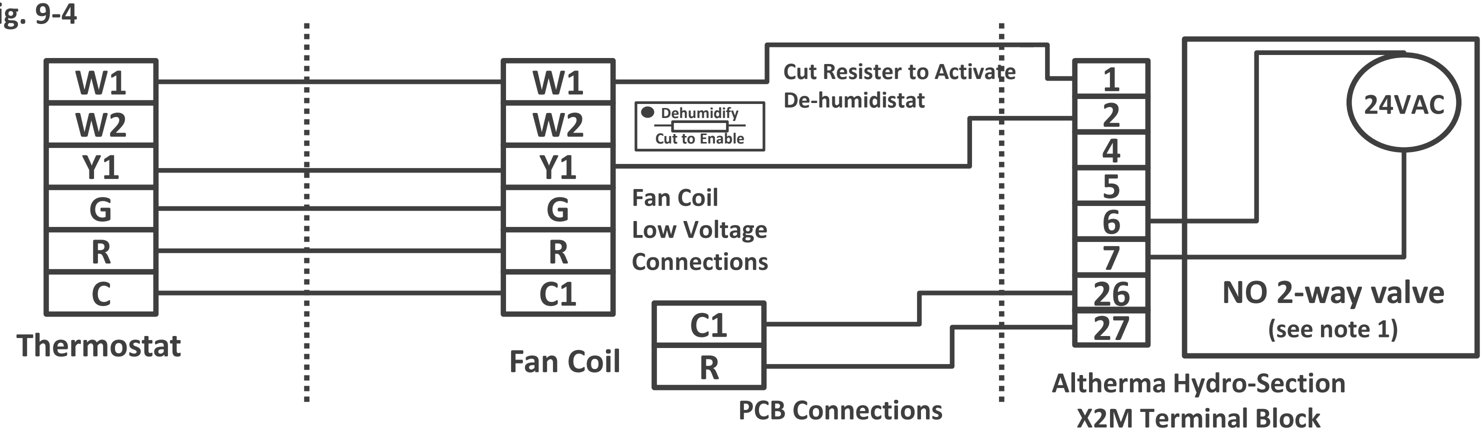
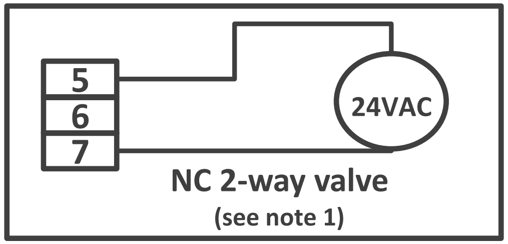
Hydronic Fan Coil Unit – Control Wiring Example

All ECM Fan Coil Unit Models – No Electric Heat

1 Stage Heating Altherma / 1 Stage Cooling / No Electric Heat

Fig. 9-4





Notes:
1. 2-way valve is only needed when individual heating circuits need separation. (i.e. under floor heating to fan coil only cooling) 24 VAC 100 mA max.
2. Make sure to set Heating/Cooling fan speeds (see section 10)

Refer to installation instructions for further examples and details

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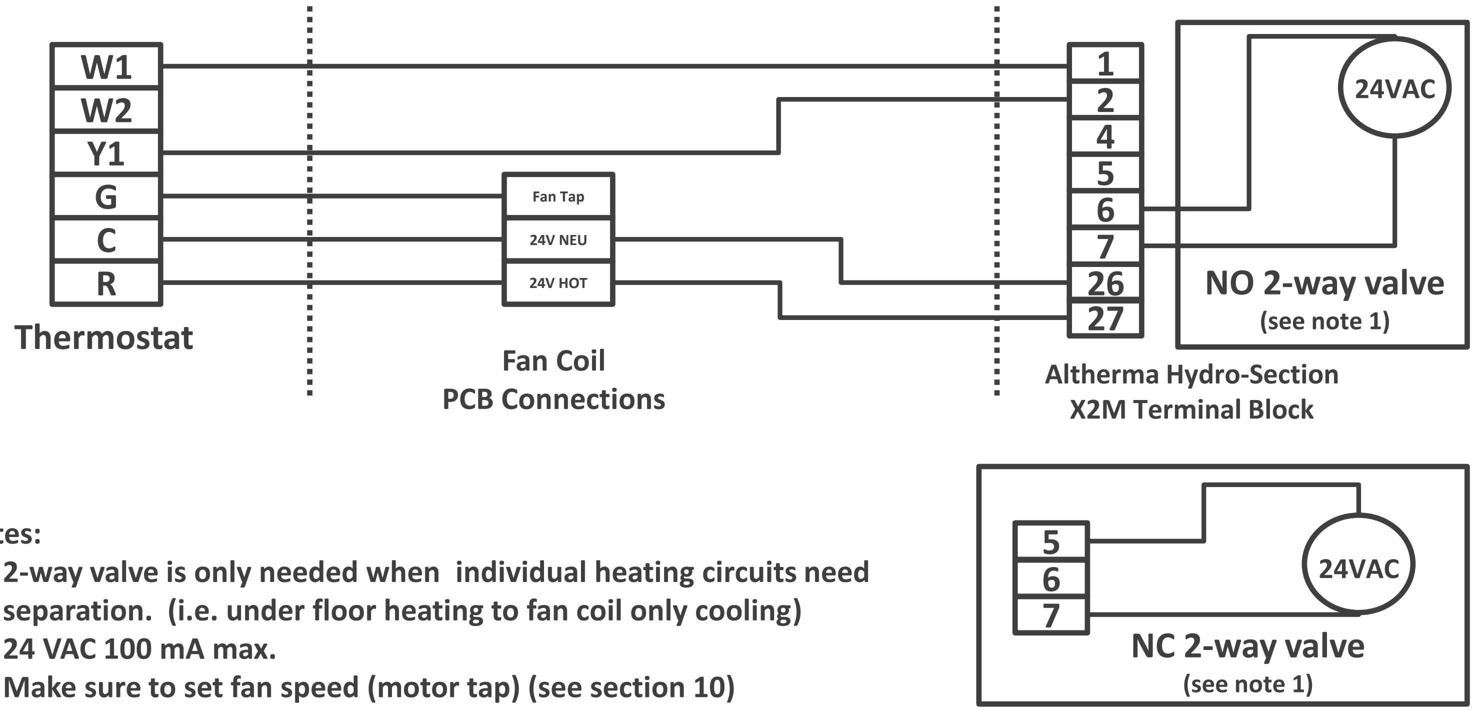
Hydronic Fan Coil Unit – Control Wiring Example

All 120 VAC PSC Fan Coil Unit Models – No Electric Heat

1 Stage Heating Altherma / 1 Stage Cooling / No Electric Heat

Fig. 9-4



Notes:

1. 2-way valve is only needed when individual heating circuits need separation. (i.e. under floor heating to fan coil only cooling) 24 VAC 100 mA max.
2. Make sure to set fan speed (motor tap) (see section 10)
3. Remove 2 red jumpers from fan coil PCB for 24 volt control circuit

Refer to installation instructions for further examples and details

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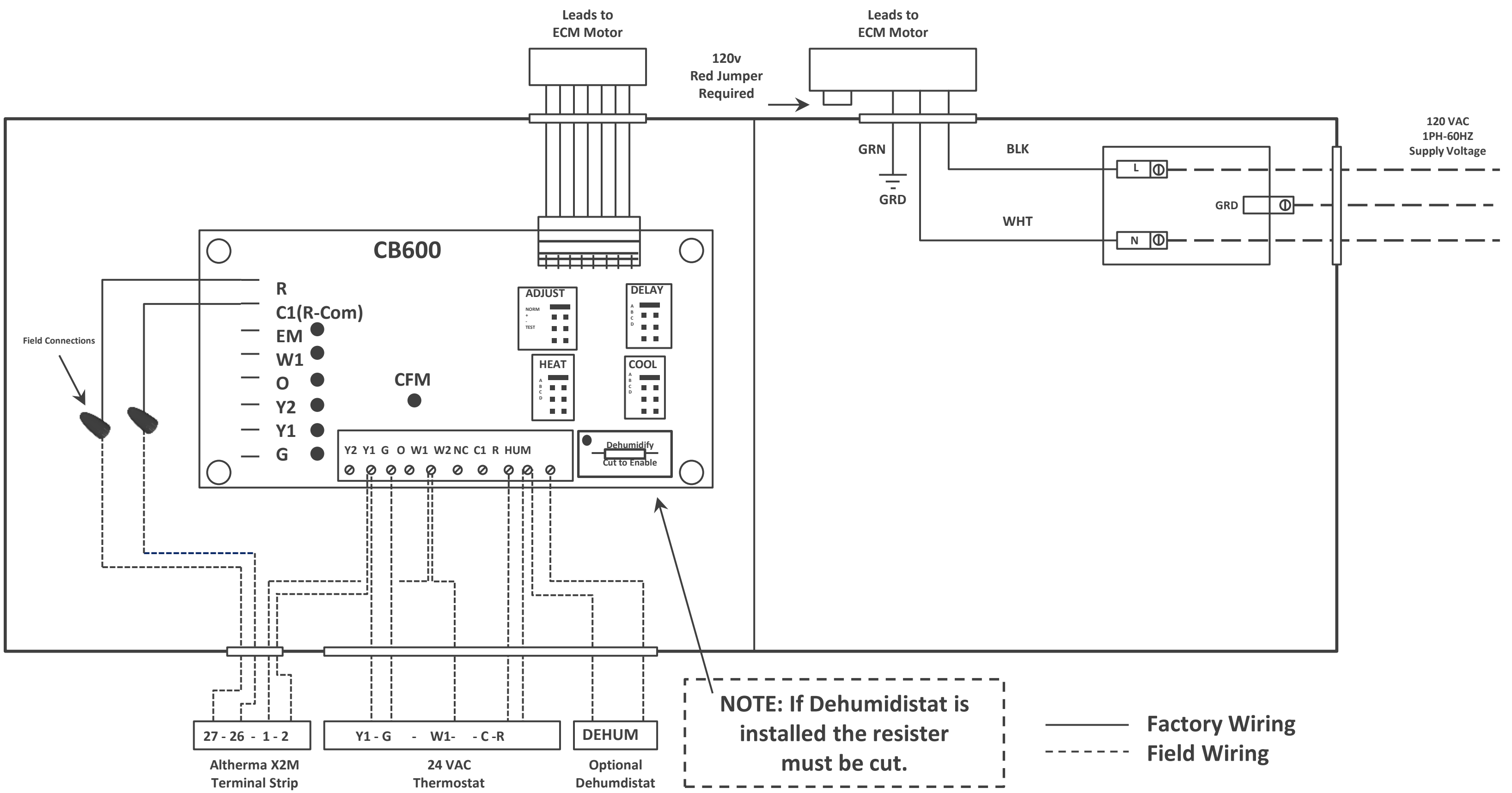
Hydronic Fan Coil Unit – Field Wiring Example

EFWT018~036AEVLU Fan Coil (120V-ECM) / Altherma



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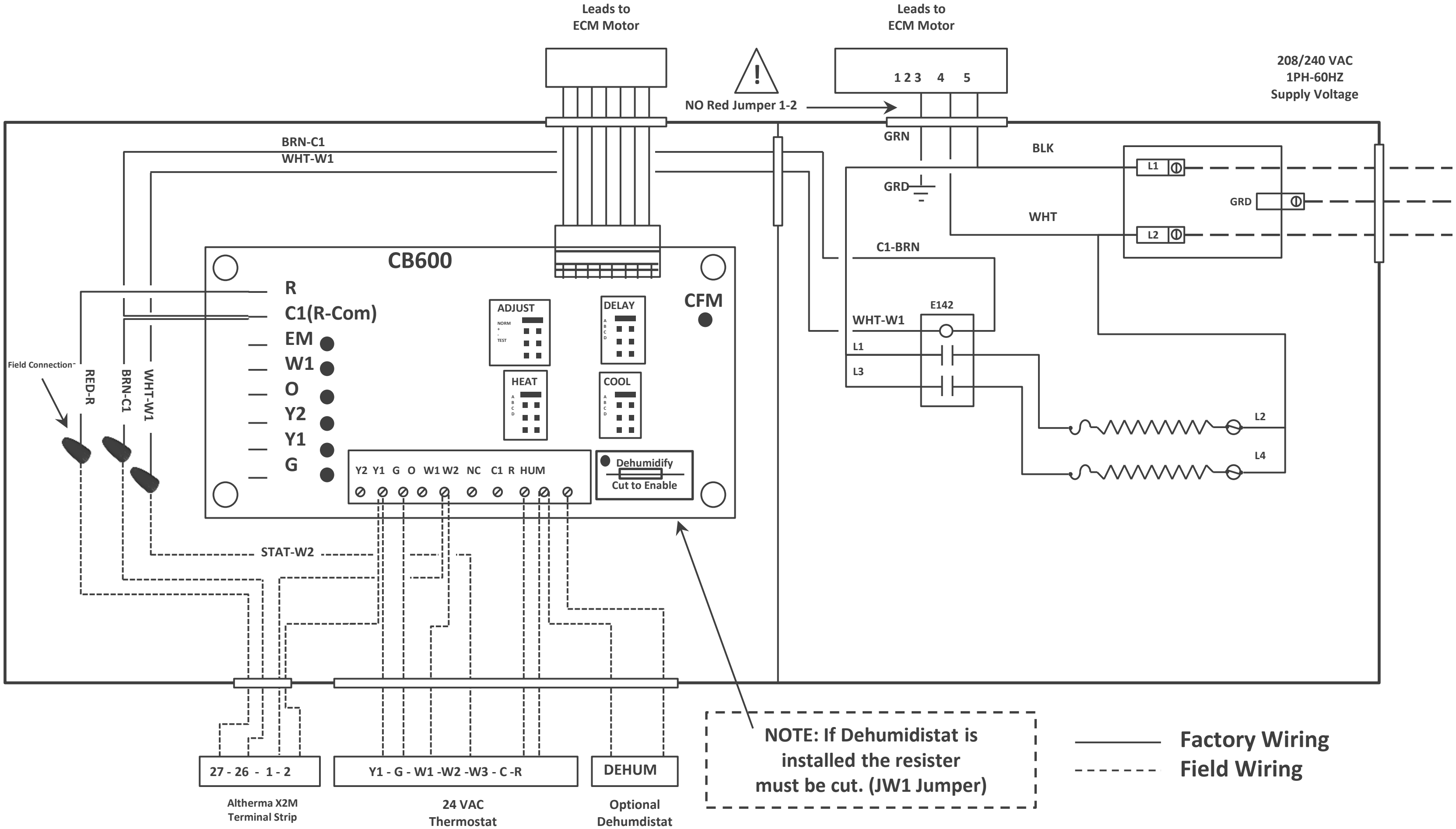
Refer to installation instructions for further examples and details

Hydronic Fan Coil Unit – Field Wiring Example

EFWT_AEVJU-05 Fan Coil (208/240V-ECM-05kW Electric Heat) / Altherma
EFWT_AEVJU-10 Fan Coil (208/240V-ECM-10kW Electric Heat) / Altherma



Refer to installation instructions for further examples and details

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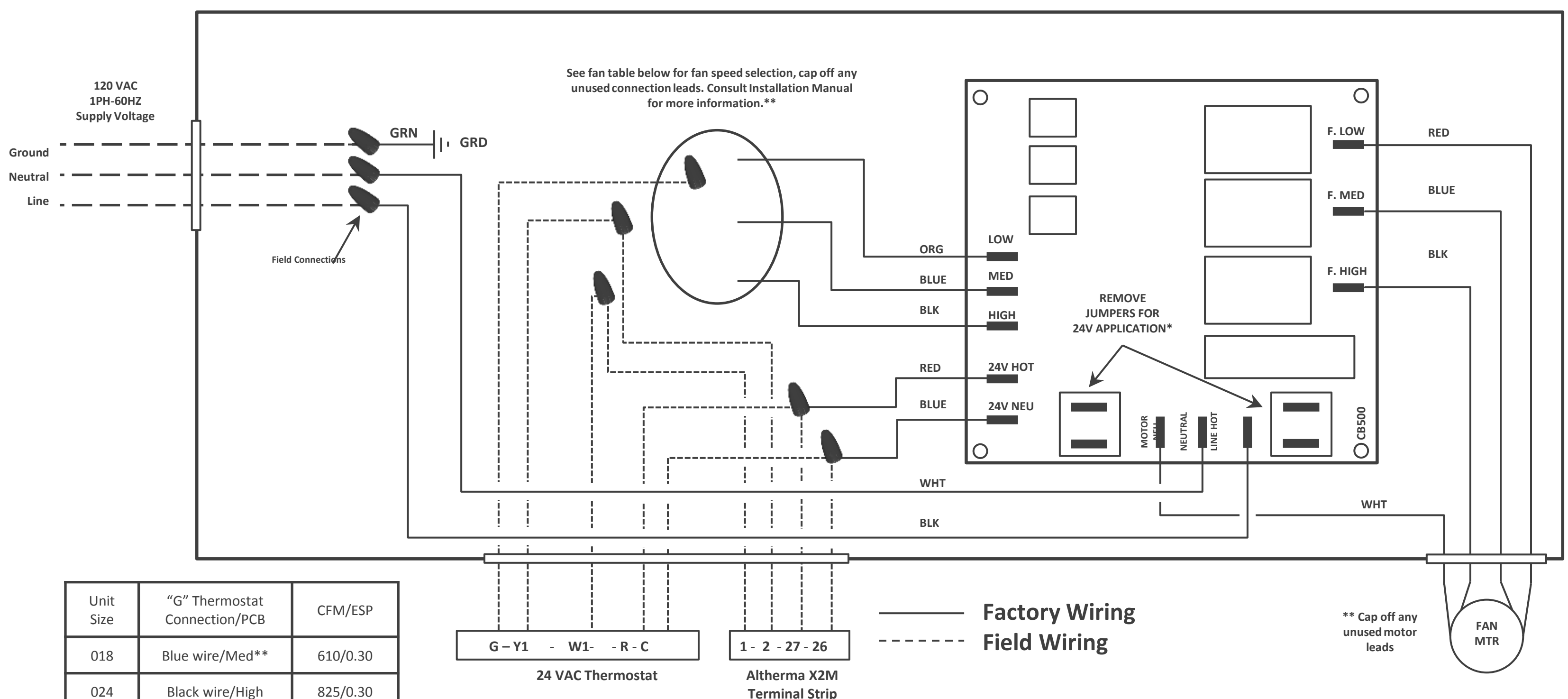
Hydronic Fan Coil Unit – Field Wiring Example

EFWT_APVLU Fan Coil (120V-PSC) / Altherma



Unit Size	"G" Thermostat Connection/PCB	CFM/ESP
018	Blue wire/Med**	610/0.30
024	Black wire/High	825/0.30
030	Blue wire/Med**	1010/0.20
036	Black wire/High	1220/0.05
048	Black wire/High	1620/0.20
060	Black wire/High	1840/0.50

NOTE:
* - Remove 2 red jumpers from fan coil PCB for 24 volt control circuit
** - When Blue wire/Med fan speed is selected, verify Med-Hi tap on motor being used

Refer to installation instructions for further examples and details

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Hydronic Fan Coil Unit – Fan Speed Selection

When installing the fan coil a appropriate fan speed needs to be selected prior to start up.

The installation manual has a chart for the installer to use to make the selection simple and easy to do.

This chart is for both ECM fan motor fan coils; 120VAC & 208/240VAC units.

EFWT018 (EFWT024)

Model	Operation Mode	Control Board Select Tap: Cool Tap				Heat Tap				Fan Speed Tap Settings
		A	B	**C**	D	A	B	**C**	D	
EFWT024 Setup for EFWT018	Cooling thermostat signal	800	700	**600**	500					**Set Cooling tap to C** C 600 CFM **Set Heating tap to C** C 600 CFM
	Continuous blower	400	350	300	250					
	Heating thermostat signal					800	700	**600**	500	

EFWT024

Model	Operation Mode	Control Board Select Tap: Cool Tap				Heat Tap				Fan Speed Tap Settings
		A	B	C	D	**A**	B	C	D	
EFWT024	Cooling thermostat signal	**800**	700	600	500					**Set Cooling tap to A** A 800 CFM **Set Heating tap to A** A 800 CFM
	Continuous blower	400	350	300	250					
	Heating thermostat signal					**800**	700	600	500	

EFWT030 (EFWT036)

Model	Operation Mode	Control Board Select Tap: Cool Tap				Heat Tap				Fan Speed Tap Settings
		A	**B**	C	D	A	**B**	C	D	
EFWT036 Setup for EFWT030	Cooling thermostat signal	1200	**1050**	900	750					**Set Cooling tap to B** B 1050 CFM **Set Heating tap to B** B 1050 CFM
	Continuous blower	600	525	400	375					
	Heating thermostat signal					1200	**1050**	900	750	

EFWT036

Model	Operation Mode	Control Board Select Tap: Cool Tap				Heat Tap				Fan Speed Tap Settings
		A	B	C	D	**A**	B	C	D	
EFWT036	Cooling thermostat signal	**1200**	1050	900	750					**Set Cooling tap to A** A 1200 CFM **Set Heating tap to A** A 1200 CFM
	Continuous blower	600	525	400	375					
	Heating thermostat signal					**1200**	1050	900	750	

EFWT048

Model	Operation Mode	Control Board Select Tap: Cool Tap				Heat Tap				Fan Speed Tap Settings
		A	B	C	D	**A**	B	C	D	
EFWT048	Cooling thermostat signal	**1600**	1400	1200	1000					**Set Cooling tap to A** A 1600 CFM **Set Heating tap to A** A 1600 CFM
	Continuous blower	800	700	600	500					
	Heating thermostat signal					**1600**	1400	1200	1000	

EFWT060

Model	Operation Mode	Control Board Select Tap: Cool Tap				Heat Tap				Fan Speed Tap Settings
		A	B	C	D	**A**	B	C	D	
EFWT060	Cooling thermostat signal	**1825**	1700	1600	1400					**Set Cooling tap to A** A 1825 CFM **Set Heating tap to A** A 1825 CFM
	Continuous blower	900	850	800	700					
	Heating thermostat signal					**1825**	1700	1600	1400	

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Hydronic Fan Coil Unit – Fan Speed Selection

When installing the fan coil a appropriate fan speed needs to be selected prior to start up.

The installation manual has a chart for the installer to use to make the selection simple and easy to do.

This chart is for 120VAC PSC fan coil units.

Model	Nominal Cooing Tons	Motor HP-Amp (120V)	Motor Speed	CFM vs. External Static Pressure						Fan Speed Tap Settings
				0.05	0.10	0.20	0.30	0.40	0.50	
EFWT018APVLU (EFWT024 Airflow modified for EFWT018)	1.5	1/5-3.0	High	920	890	825	750	680	580	Connect G from thermostat to motor tap for 600 CFM at desired static;
			Med-Hi	750	730	680	610	540	450	
			Med-Low	555	530	480	420	330	- - -	
			Low	350	310	240	170	100	- - -	
EFWT024APVLU	2	1/5-3.0	High	920	890	825	750	680	580	Connect G from thermostat to motor tap for 800 CFM at desired static
			Med-Hi	750	730	680	610	540	450	
			Med-Low	555	530	480	420	330	- - -	
			Low	350	310	240	170	100	- - -	
EFWT030APVLU (EFWT036 Airflow modified for EFWT030)	2.5	1/3-6.0	High	1220	1185	1120	1070	1015	960	Connect G from thermostat to motor tap for 1000 CFM at desired static
			Med-Hi	1085	1060	1010	960	910	865	
			Med-Low	935	915	875	830	775	700	
			Low	750	730	695	650	605	500	
EFWT036APVLU	3	1/3-6.0	High	1220	1185	1120	1070	1015	960	Connect G from thermostat to motor tap for 1200 CFM at desired static
			Med-Hi	1085	1060	1010	960	910	865	
			Med-Low	935	915	875	830	775	700	
			Low	750	730	695	650	605	500	
EFWT048APVLU	4	1/2-8.0	High	1730	1690	1620	1540	1450	1350	Connect G from thermostat to motor tap for 1600 CFM at desired static
			Med	1580	1550	1490	1430	1360	1270	
			Low	1360	1340	1310	1270	1210	1100	
EFWT060APVLU	5	3/4-10.5	High	2030	2000	1950	1900	1840	1770	Connect G from thermostat to motor tap for 2000 CFM at desired static
			Med	1630	1615	1580	1540	1490	1440	
			Low	1280	1270	1240	1210	1180	1140	

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Hydronic Fan Coil Unit – Air Filter

Install the air filter, sizes shown below

Fig. 11-1

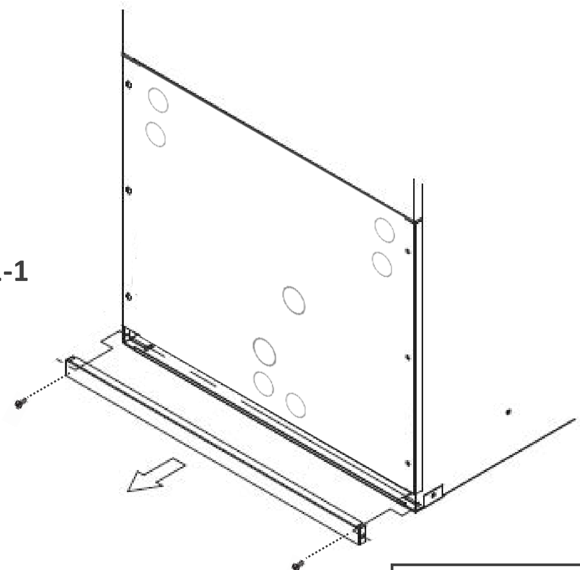
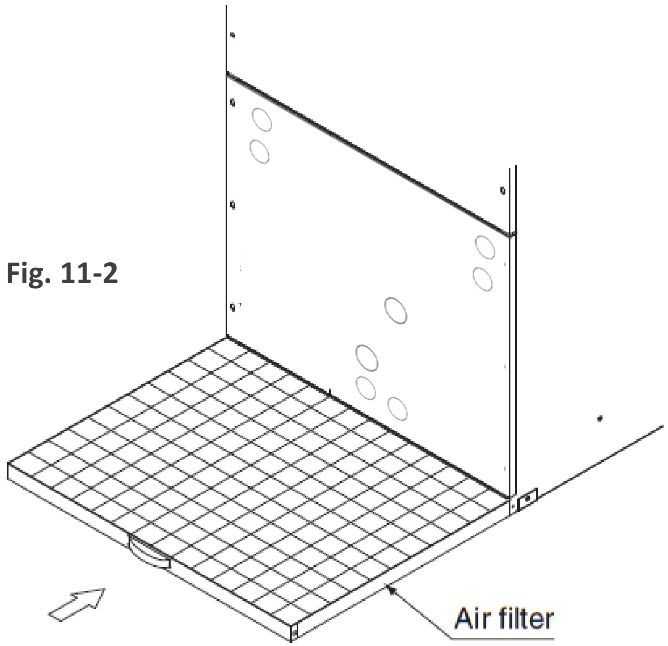


Fig. 11-2



Fan Coil Unit	Filter Size (H x W x D)
EFWT018 EFWT024	18” x 20” x 1”
EFWT030 EFWT036	20” x 22” x 1”
EFWT048	20” x 25” x 1”
EFWT060	20” x 25” x 1”

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Hydronic Fan Coil Unit – Performance Tables

Heating Mode – All Model Types

= Specific to Nominal Unit Sizes

Unit Model	Nom. CFM	GPM (HTG)	PD (FT. Water)	Heating BTUH @ Entering Water Temp.					
				100 °F	105°F	110 °F	115 °F	120 °F	125 °F
EFWT024	800	6.0	9.5	19.5	22.8	26	29.3	32.6	35.8
		4.5	5.5	18.8	21.9	25	28.2	31.3	34.4
		3.0	2.5	17.5	20.5	23.4	26.3	29.2	32.2
	700	6.0	9.5	17.7	20.7	23.7	26.6	29.6	32.5
		4.5	5.5	17.1	20	22.8	25.7	28.5	31.4
		3.0	2.5	16.0	18.7	21.4	24.1	26.7	29.4
	600	4.0	4.4	15.1	17.6	20.1	22.6	25.1	27.6
		3.0	2.5	14.4	16.8	19.3	21.7	24.1	26.5
		2.0	1.2	13.5	15.7	17.9	20.2	22.4	24.7
	500	4.0	4.4	13.2	15.4	17.6	19.8	22.0	24.2
		3.0	2.5	12.7	14.8	16.9	19.1	21.2	23.3
		2.0	1.2	11.9	13.9	15.9	17.9	19.9	21.9
EFWT036	1200	6.0	4.8	27.5	32.0	36.6	41.2	45.8	50.3
		4.5	3.0	26.1	30.5	34.8	39.2	43.5	47.9
		3.0	1.5	24.0	28.0	32.0	36.0	39.9	43.9
	1050	6.0	4.8	25.1	29.2	33.4	37.	41.8	45.9
		4.5	3.0	23.9	27.9	31.9	35.9	39.8	43.8
		3.0	1.5	22.1	25.8	29.5	33.1	36.8	40.5
	900	4.0	2.4	21.1	24.6	28.1	31.6	35.2	38.7
		3.0	1.5	20.0	23.4	26.7	30.0	33.4	36.7
		2.0	0.70	17.2	20.0	22.9	25.8	28.6	31.5
	750	4.0	2.4	18.6	21.7	24.8	27.9	31.0	34.1
		3.0	1.5	17.7	20.7	23.7	26.6	29.6	32.5
		2.0	0.70	15.4	17.9	20.5	23.0	25.6	28.2

Unit Model	Nom. CFM	GPM (HTG)	PD (FT. Water)	Heating BTUH @ Entering Water Temp.					
				100 °F	105°F	110 °F	115 °F	120 °F	125 °F
EFWT048	1600	10.0	7.9	39.0	45.5	52.0	58.5	65.0	71.5
		8.0	5.4	37.7	44.4	50.2	56.5	62.8	69.1
		6.0	3.3	35.8	41.8	47.8	49.2	59.7	65.7
	1400	10.0	7.9	35.4	41.3	47.3	53.2	59.1	65.0
		8.0	5.4	34.3	40.1	45.8	51.5	57.2	63.0
		6.0	3.3	32.8	38.2	43.7	49.2	54.6	60.1
	1200	6.0	3.3	29.5	34.4	39.3	44.2	49.1	54.0
		5.0	2.4	28.6	33.4	38.1	42.9	47.7	52.4
		4.0	1.6	27.5	32.0	36.6	41.2	45.8	50.3
	1000	6.0	3.3	26.0	30.3	34.7	39.2	43.5	47.7
		5.0	2.4	25.2	29.4	33.6	38.0	42.2	46.3
		4.0	1.6	24.2	28.2	32.3	36.5	40.5	44.5
EFWT060	1825	13.0	12.5	44.2	51.6	59.0	66.4	73.7	81.1
		10.0	7.9	42.7	49.8	57.0	64.1	71.2	78.3
		7.0	4.3	40.2	46.9	53.6	60.3	67.0	73.7
	1800	12.0	10.9	43.4	50.6	57.9	65.1	72.3	79.6
		10.0	7.9	42.3	49.3	56.4	63.5	70.5	77.6
		7.0	4.3	39.9	46.5	53.1	59.8	66.4	73.1
	1600	9.0	6.6	38.4	44.8	51.2	57.6	64.0	70.4
		7.0	4.3	36.8	43.0	49.1	55.3	61.4	67.6
		5.0	2.4	34.6	40.3	46.1	51.9	57.6	63.4
	1400	9.0	6.6	34.8	40.5	46.4	52.4	58.2	63.9
		7.0	4.3	33.2	38.7	44.3	50.1	55.6	61.1
		5.0	2.4	31.2	36.4	41.7	47.1	52.3	57.4

Based on 70°F entering air condition

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Hydronic Fan Coil Unit – Performance Tables

Cooling Mode – All Model Types

UNIT MODEL	NOM. CFM	GPM	P.D. (FT. WTR.)	50' F ENTERING WATER						45' F ENTERING WATER						42' F ENTERING WATER						40' F ENTERING WATER					
				80'F DB/67'F WB ENT. AIR			75'F DB/63'F WB ENT. AIR			80'F DB/67'F WB ENT. AIR			75'F DB/63'F WB ENT. AIR			80'F DB/67'F WB ENT. AIR			75'F DB/63'F WB ENT. AIR			80'F DB/67'F WB ENT. AIR			75'F DB/63'F WB ENT. AIR		
				TOTAL MBH.	SENS. MBH	TEMP. RISE	TOTAL MBH.	SENS. MBH	TEMP. RISE	TOTAL MBH.	SENS. MBH	TEMP. RISE	TOTAL MBH.	SENS. MBH	TEMP. RISE	TOTAL MBH.	SENS. MBH	TEMP. RISE	TOTAL MBH.	SENS. MBH	TEMP. RISE	TOTAL MBH.	SENS. MBH	TEMP. RISE	TOTAL MBH.	SENS. MBH	TEMP. RISE
EFWT024	600	3.0	2.5	16.3	13.2	10.8	12.4	11.7	8.3	19.0	13.8	12.7	14.5	12.1	9.7	20.7	14.4	13.8	15.8	12.6	10.5	22.0	15.4	14.7	16.8	13.4	11.2
		4.5	5.5	19.1	14.2	8.5	14.6	12.5	6.5	22.4	15.1	9.9	17.1	13.1	7.6	24.4	15.9	10.8	18.6	13.7	8.3	25.8	16.8	11.5	19.7	14.5	8.7
		6.0	9.5	20.8	14.9	6.9	15.9	13.0	5.3	24.4	15.9	8.2	18.7	13.7	6.2	26.6	16.8	8.9	20.3	14.4	6.8	28.1	17.8	9.4	21.5	15.3	7.2
	800	3.5	3.4	19.5	16.6	11.2	14.9	14.7	8.5	23.1	17.3	13.2	17.6	15.2	10.1	25.2	18.1	14.4	19.2	15.8	11.0	26.4	19.1	15.1	20.2	16.7	11.5
		5.0	6.7	22.6	17.7	9.1	17.3	15.6	6.9	26.9	18.7	10.7	20.5	16.3	8.2	29.3	19.6	11.7	22.4	17.1	8.9	30.6	20.7	12.2	23.4	18.0	9.4
		6.5	11.0	24.6	18.4	7.6	18.8	16.2	5.8	29.2	19.6	9.0	22.3	17.0	6.9	31.8	20.6	9.8	24.3	17.8	7.5	33.3	21.8	10.2	25.4	18.8	7.8
EFWT036	1000	4.0	2.4	24.0	20.7	12.0	18.4	18.4	9.2	28.3	21.6	14.1	21.6	19.0	10.8	30.8	22.5	15.4	23.6	19.7	11.8	32.5	23.8	16.2	24.8	20.9	12.4
		6.0	4.8	28.6	22.4	9.5	21.8	19.7	7.3	33.9	23.7	11.3	25.9	20.6	8.6	36.9	24.8	12.3	28.2	21.6	9.4	38.7	26.2	12.9	29.5	22.7	9.8
		8.0	7.9	31.4	23.4	7.9	24.0	20.6	6.0	37.3	25.0	9.3	28.5	21.7	7.1	40.6	26.3	10.2	31.0	22.7	7.8	42.5	27.7	10.6	32.5	23.9	8.1
	1200	4.5	3.5	28.6	24.5	11.4	21.8	21.8	8.7	33.7	25.5	13.5	25.8	22.4	10.3	36.8	26.6	14.7	28.1	23.3	11.3	36.7	27.5	16.3	28.0	24.1	12.5
		6.0	5.5	32.0	25.8	9.9	24.5	22.8	7.5	38.0	27.1	11.7	29.1	23.7	8.9	41.5	28.4	12.8	31.7	24.7	9.7	43.4	30.0	13.3	32.1	25.7	10.7
		8.0	7.9	34.5	26.7	8.6	26.4	23.5	6.6	41.0	28.2	10.3	31.3	24.6	7.8	44.7	29.6	11.2	34.1	25.7	8.5	46.7	31.3	11.7	35.7	27.1	8.9
EFWT048	1400	4.5	2.0	30.6	28.1	13.6	25.1	25.1	11.1	36.2	29.2	16.1	27.7	25.8	12.3	39.5	30.3	17.6	30.1	26.7	13.4	41.5	32.0	18.4	31.7	28.2	14.1
		6.0	3.3	35.6	29.9	11.9	27.2	26.5	9.1	42.4	31.4	14.1	32.4	27.6	10.8	46.2	32.8	15.4	35.3	28.7	11.8	48.1	34.5	16.0	36.8	30.2	12.3
		7.5	4.8	39.2	31.2	10.5	30.0	27.5	8.0	46.9	33.1	12.5	35.8	28.9	9.6	51.1	34.7	13.6	39.0	30.2	10.4	53.1	36.4	14.2	40.5	31.7	10.8
	1600	6.0	3.3	37.3	32.7	12.4	29.1	29.1	9.7	44.2	34.1	14.7	33.8	30.0	11.3	48.2	35.5	16.1	36.8	31.2	12.3	50.5	37.5	16.8	38.6	32.9	12.9
		8.0	5.4	42.7	34.7	10.7	32.6	30.6	8.2	51.0	36.6	12.7	38.9	32.0	9.7	55.5	38.3	13.9	42.4	33.4	10.6	57.8	40.3	14.5	44.2	35.1	11.0
		10.0	7.9	46.6	36.1	9.3	35.6	31.8	7.1	55.7	38.4	11.1	42.5	33.4	8.5	60.7	40.3	12.1	46.3	34.9	9.3	63.1	42.4	12.6	48.2	36.7	9.6
EFWT060	1600	6.5	3.8	38.9	33.3	12.0	29.7	29.5	9.1	46.1	34.8	14.2	35.2	30.6	10.8	50.3	36.3	15.5	38.4	31.8	11.8	52.6	38.3	16.2	40.2	33.5	12.4
		8.5	6.0	43.8	35.1	10.3	33.5	31.0	7.9	52.3	37.1	12.3	39.9	32.4	9.4	57.0	38.8	13.4	43.5	33.8	10.2	59.3	40.9	14.0	45.3	35.6	50.7
		10.5	8.6	46.6	36.1	9.3	36.2	32.0	6.9	56.6	38.7	10.8	43.2	33.7	8.2	61.7	40.7	11.8	47.1	35.2	9.0	63.1	42.4	12.6	49.0	37.0	49.3
	1825	7.0	4.3	42.3	36.9	12.1	32.8	32.8	9.4	49.7	39.6	14.2	38.0	35.0	10.8	54.2	41.2	15.5	41.4	36.3	11.8	57.2	42.4	16.3	43.7	37.1	12.5
		10.0	7.9	49.6	39.5	9.9	37.9	3.9	7.6	58.3	42.8	11.7	44.5	37.5	8.9	63.6	44.8	12.7	48.6	39.1	9.3	67.1	46.1	13.4	51.2	40.1	10.2
		13.0	12.5	54.2	41.3	8.3	41.4	36.3	6.4	63.8	44.9	9.8	48.7	39.1	7.5	69.5	47.1	10.7	53.1	40.9	7.8	73.4	48.6	11.3	56.0	42.0	8.6

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For more detailed information check Daikin's Engineering, Installation, Operation and Service manuals.
Available at www.daikinac.com

Thank You

Daikin Altherma™



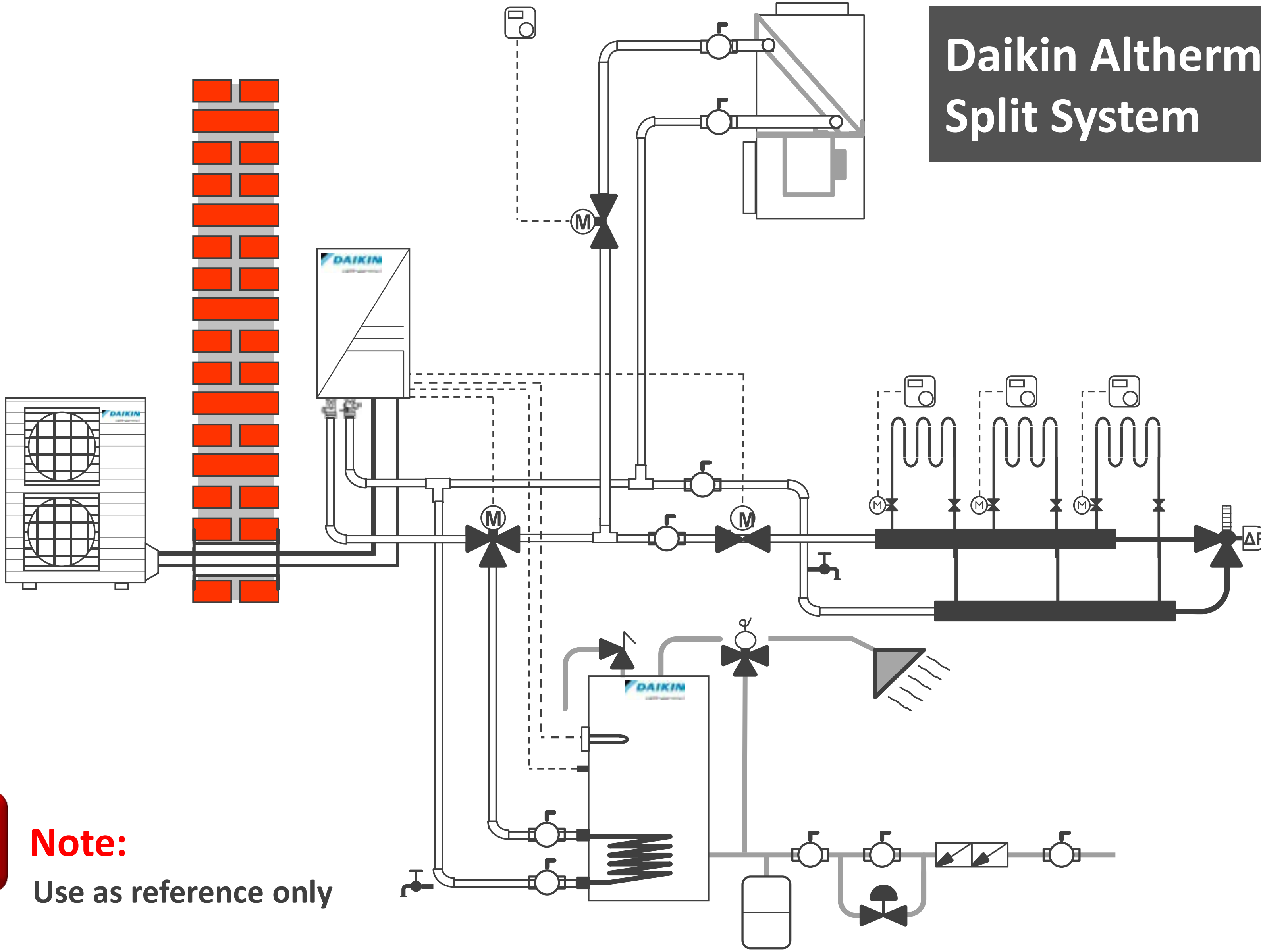
RESIDENTIAL | LIGHT COMMERCIAL | COMMERCIAL

Water Piping Layout and Design Considerations

Water Piping Layout and Design Considerations

- Daikin Altherma has not changed Hydronics, we only heat and cool the water a little differently.
- Once water piping leaves the Daikin Altherma standard methods of designing hydronic systems apply.
- After a Daikin Altherma system and type of heating & cooling emitters are selected, it is now time to design a water distribution system that will deliver the required BTU's to the fan coils, radiant floor or convectors.
- The next few slides will shown several different piping designs.

Daikin Altherma Split System



Note:
Use as reference only

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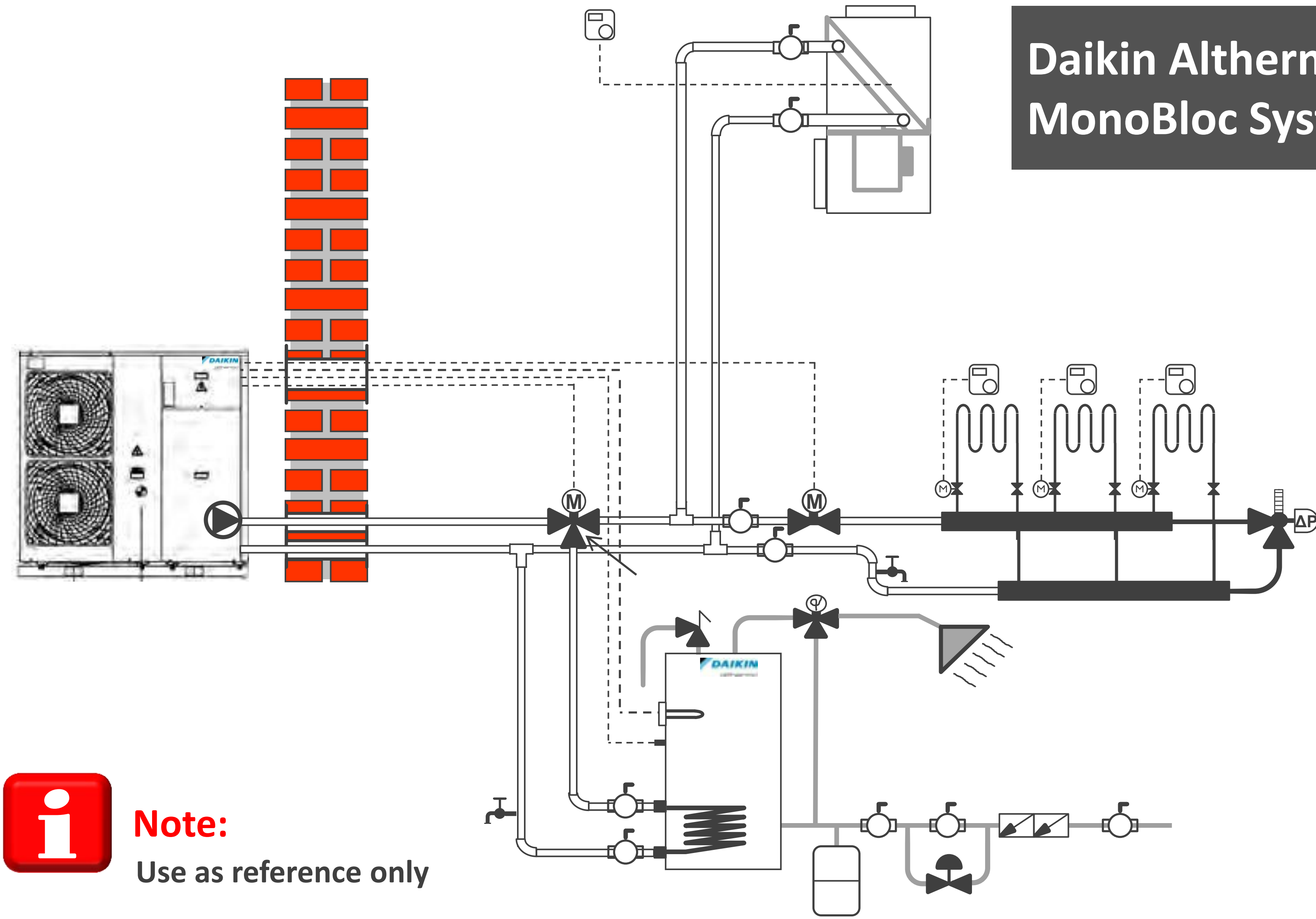
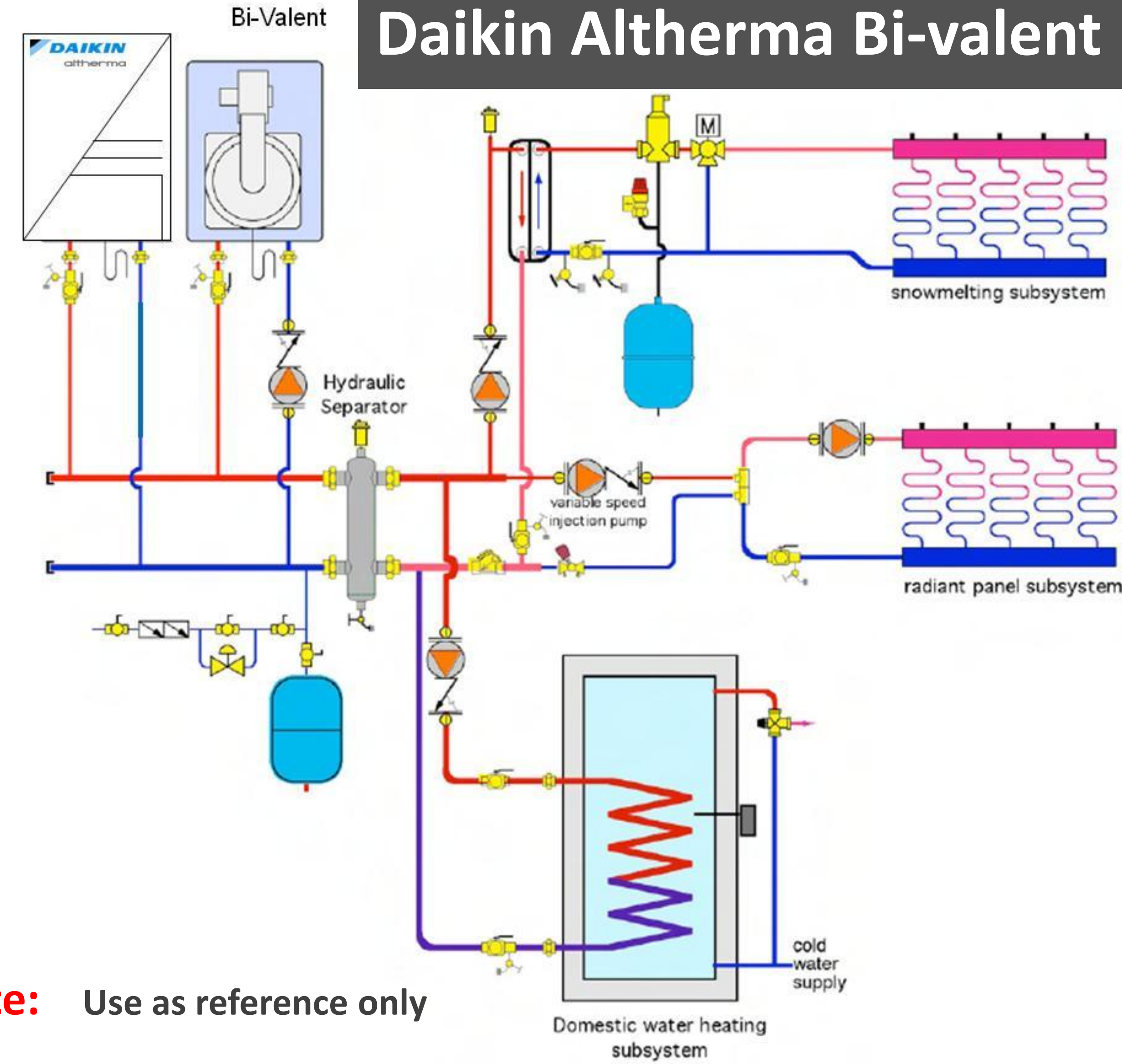
Daikin Altherma MonoBloc System



Note:
Use as reference only

Daikin Altherma Bi-valent



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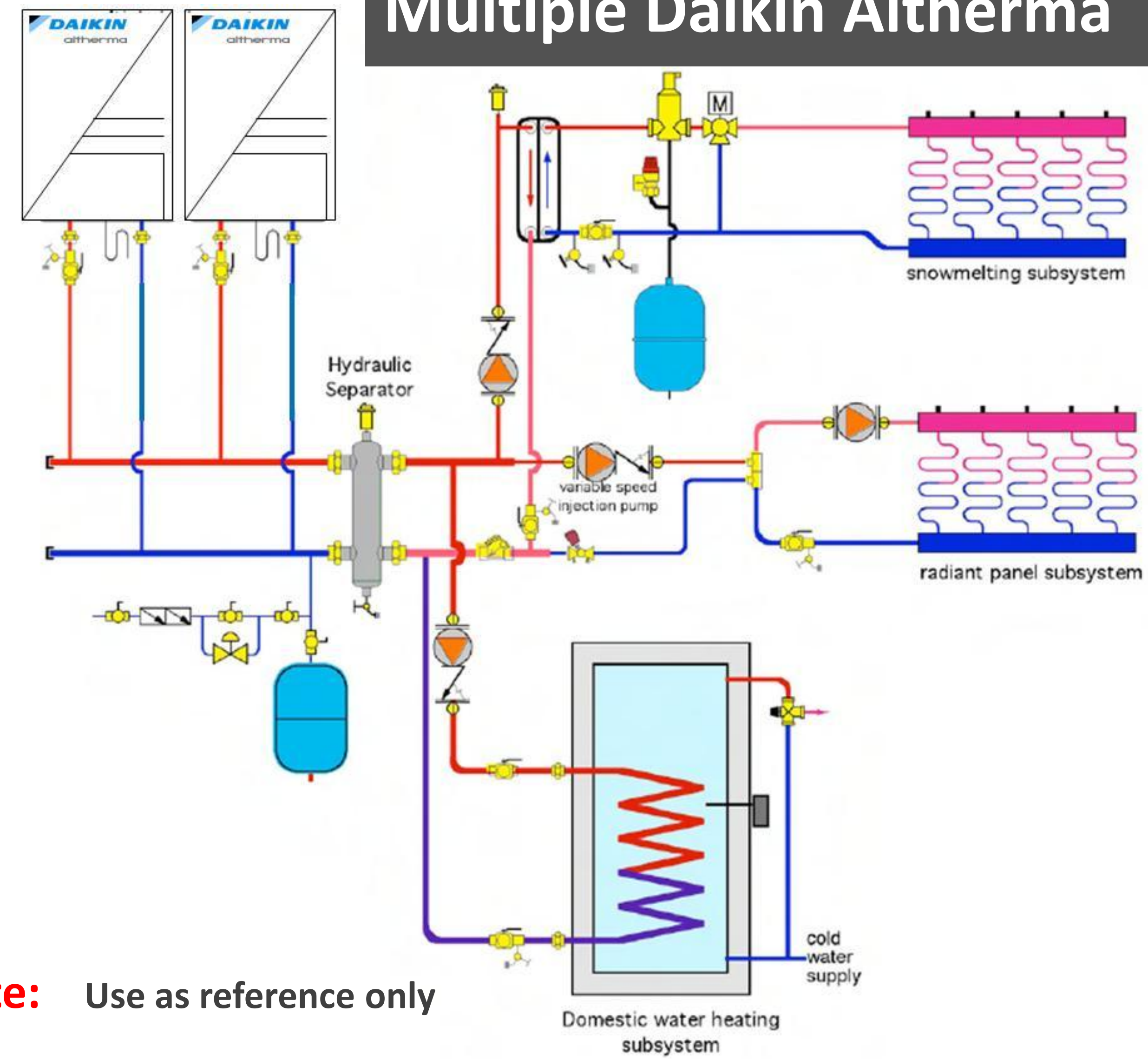
Note: Use as reference only

Multiple Daikin Altherma



Note: Use as reference only

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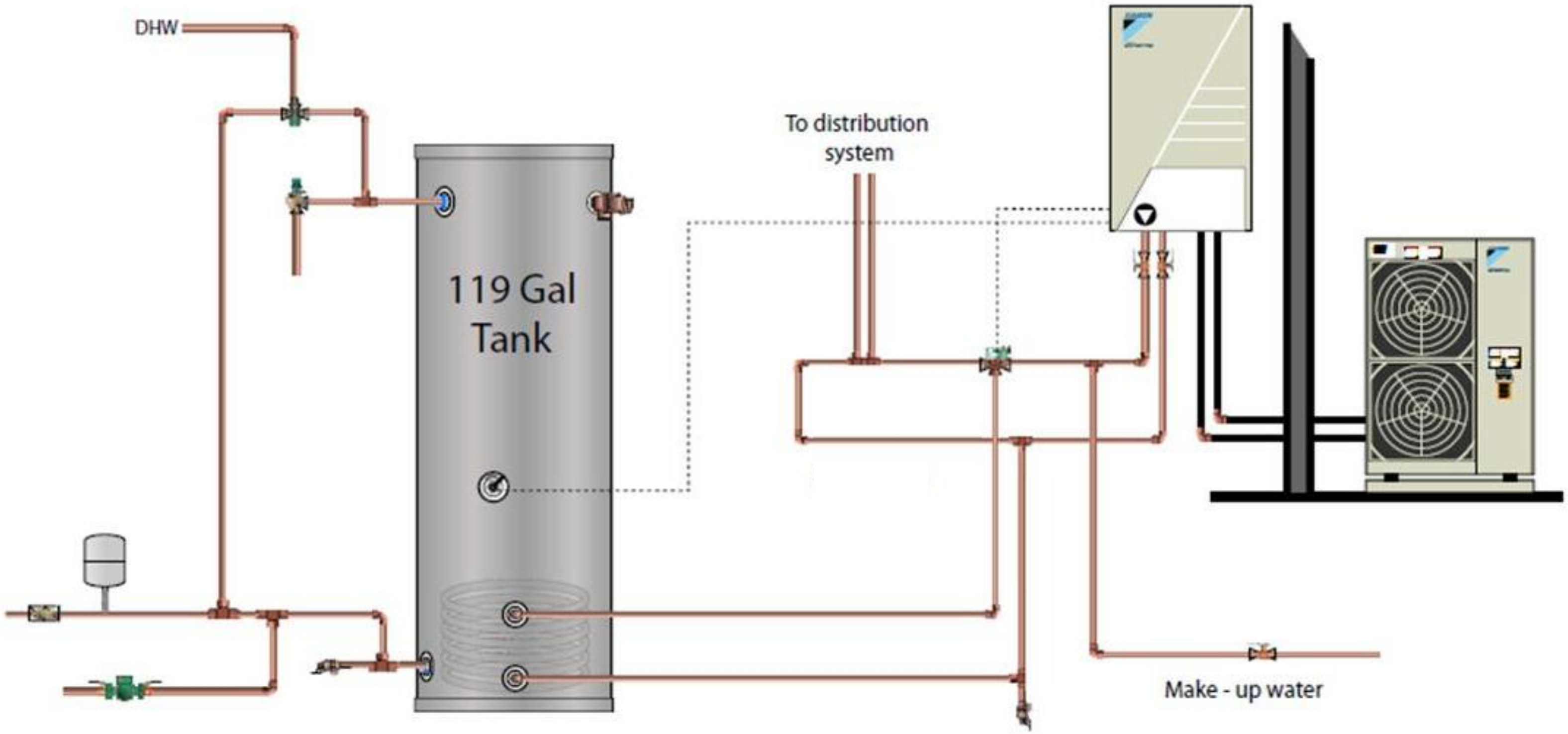
Daikin Altherma & Larger Water Tank



DACA-DHW-KIT-1 required for this application

- Buffer tank application
- DHW
- Space heating

Note: Use as reference only

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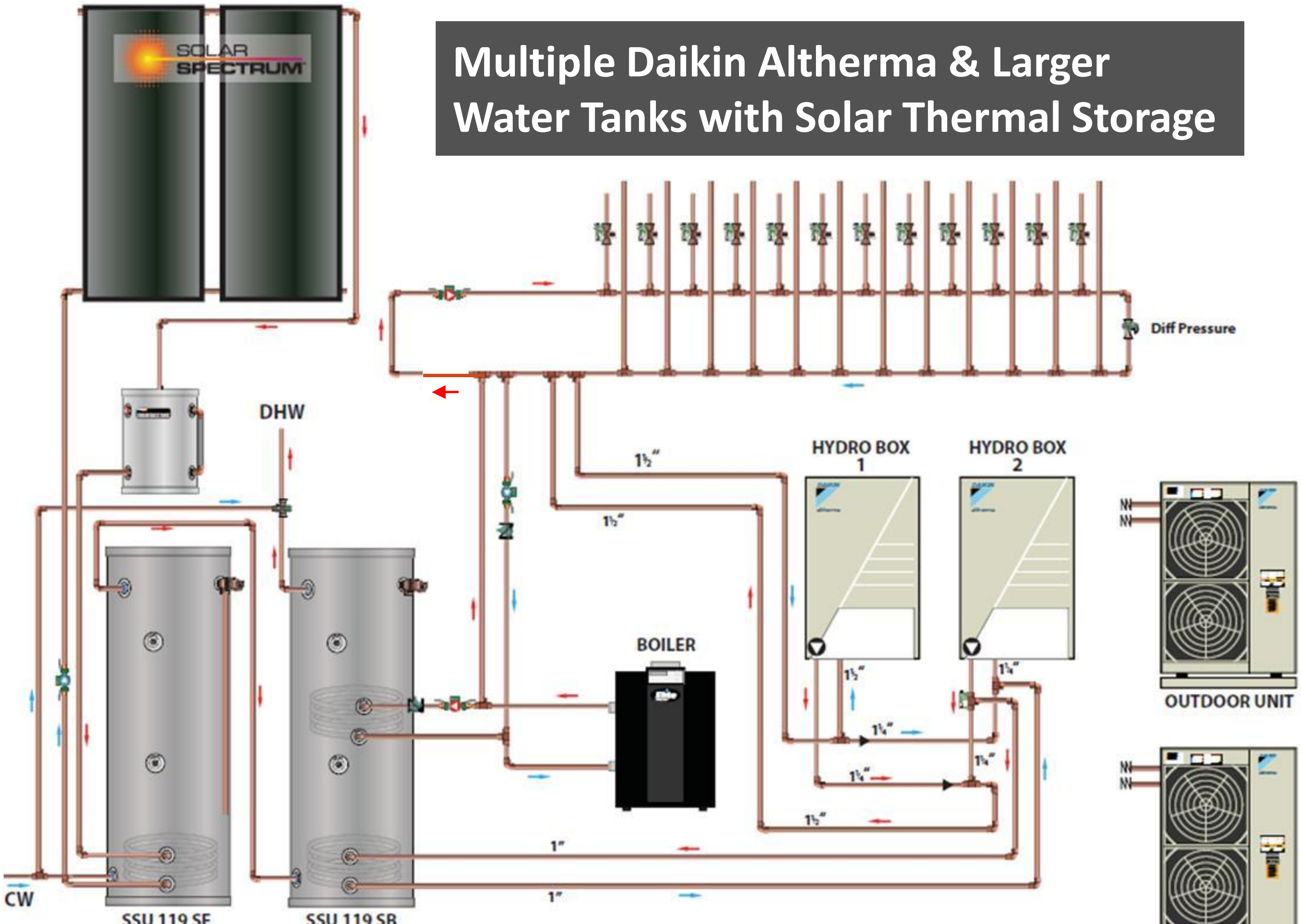
Multiple Daikin Altherma & Larger Water Tanks with Solar Thermal Storage



Note: Use as reference only

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Water Piping Layout and Design Considerations

During design and installation several items need to be considered for the water circuit.

Water quality - Filling system	If supply water is from well, a filter needs to be installed
Minimum water volume	Heating, Cooling and DHW mode require a minimum water volume for optimum equipment operation
Piping material selection	The type of material the piping is made of can affect water flow greatly, example - pex on average has twice the flow restriction than copper
Equipment & component pressure drops	All equipment and water piping components have pressure drops associated with them, these must be added up to verify the total pressure drop is within limitations of the system
Daikin Altherma flow & pump ESP	The Daikin Altherma Engineering Manual will show nominal, min and max flow rates as well nominal ESP ratings of the internal pump
Glycol	Glycol can be used when water piping is exposed to below freezing temperatures
Pump speed selection	Pump speed should be selected and set once the total pressure drop of the system has been calculated
Differential pressure by-pass	A differential by-pass can be installed to help maintain different flow rates in the distribution system
DHW piping	Minimum of 1” pipe needs to be connected from the water distribution piping to the DHW heat exchanger
2-way valve (Cooling)	If needed a 2-way valve can be installed when separation of cooling and heating water loops is needed
Misc. devices	For proper operation install buffer tanks, air elimination, ball valves and other hydronic controls as needed

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Water Quality & Filling the System with Water

- Water quality must be in accordance with the “Safe Drinking Water Act (42 U.S.C. 300F)”. For more information go to; http://water.epa.gov/drink.
- All well water supplied systems need a pre-filter and water quality should be checked for possible treatment needs.
- It is recommended to use either a automatic fill valve or a manual fill valve so proper system water pressure is maintained.
- The fill valve should be set to a pressure that corresponds to the highest water point in the system.
- Minimum water pressure is 4.3 PSI and maximum is 43.5 PSI.

PSI	Feet Head	PSI	Feet Head
4.3	10	13.0	30
6.5	15	15.2	35
8.6	20	17.3	40
10.8	25	19.5	45

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- Note: To find PSI for any feet head, multiply feet head by 0.433

Minimum Water Volume

- During operation a minimum water volume must be maintained for Heating & Cooling modes.
- If needed install a buffer tank to meet the minimum volume requirements.

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EKHBH054BA / EKHBX054BA / All MonoBloc's

Minimum water volume

- Heating only model: 5.28 gal / 20 liter
- Heating / Cooling model: 5.28 gal / 20 liter

EKHBH030BA / EKHBX030BA

Minimum water volume

- Heating only model: 2.64 gal / 10 liter
- Heating / Cooling model: 2.64 gal / 10 liter

Type M Copper Internal Volume	
¾"	37' = 1 gal (0.0269 gal per ft)
1"	22' = 1 gal (0.0454 gal per ft)
1 ¼"	15' = 1 gal (0.0681 per ft)
1 ½"	11' = 1 gal (0.0951 per ft)
2"	6' = 1 gal (0.165 per ft)

Piping Material Selection

- The selection of pipe and fittings can greatly increase of decrease the system's overall pressure drop.
- The two tables below show Copper vs. Pex
- When comparing Copper to Pex, if pipe size and flow is the same for each the total system PD will double when Pex is used over copper.
- Pex fittings over Copper fittings will also double in PD.
- Piping materials that are considered <u>must</u> have an oxygen barrier
- Combinations of materials is often a good alternative to meet the systems required flow.

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Copper

Fluid Flow Rate GPM	Type M Copper Nominal Size	Type M Copper Per 100'
GPM	Inches	Ft Hd
4	0.75	3.47
4	1	0.92
6	**1**	**2.70**
8	1	4.50
10	1	6.70
12	**1.25**	**3.38**

Pex

Fluid Flow Rate GPM	Type Pex Nominal Size	Type Pex Per 100'
GPM	Inches	Ft Hd
4	0.75	8.15
4	1	2.48
6	**1**	**5.02**
8	1.25	3.21
10	1.25	4.86
12	**1.25**	**6.80**

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Equipment Pressure Drops

- All manufactures publish PD calculations for fittings, valves, buffer tanks, piping, etc:.
- A helpful PD conversion formula - PSI = Ft. of Hd. ÷ 2.31
- Some manufactures publish these ratings by water temperature.
- Fan coils have ratings by GPM, see below example.

Unit Model	Nom. CFM	GPM (HTG)	PD (FT. Water)	Heating BTUH @ Entering Water Temp.					
				100 °F	105°F	110 °F	115 °F	120 °F	125 °F
EFWT048	1600	10.0	7.9	39.0	45.5	52.0	58.5	65.0	71.5
		8.0	5.4	37.7	44.4	50.2	56.5	62.8	69.1
		6.0	3.3	35.8	41.8	47.8	49.2	59.7	65.7

Unit Model	Nom. CFM	GPM (HTG)	PD (FT. Water)	Heating BTUH @ Entering Water Temp.					
				100 °F	105°F	110 °F	115 °F	120 °F	125 °F
EFWT060	2000	12.0	10.9	46.8	54.6	62.4	70.2	78.0	85.8
		10.0	7.9	45.6	53.3	60.9	68.5	76.1	83.7
		7.0	4.3	43.0	50.1	57.3	64.5	71.6	78.8

- In cases where the required flow is less than the Nominal flow of the Daikin Altherma, install a pressure by-pass to offset.

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Daikin Altherma Flow and Pump ESP

- The Daikin Altherma Engineering Manual lists Min/Max and Nominal flow values and also nominal ESP's for the internal pump.
- It is recommended that the nominal ESP ratings be considered during the design of the distribution system.

2. Specifications - Hydrobox

2-1 TECHNICAL SPECIFICATIONS

					EKHBH*			EKHBX*		
					EKHBH054BA*			EKHBX054BA*		
Outdoor units					ERLQ036BAVJU	ERLQ048BAVJU	ERLQ054BAVJU	ERLQ036BAVJU	ERLQ048BAVJU	ERLQ054BAVJU
Main Components	Pump	Nominal ESP unit	Cooling	psi (kPa)	–	–	–	8.04 (55.4)	6.53 (45.0)	6.13 (42.3)
			Heating	psi (kPa)	7.34 (50.7)	5.48 (37.8)	3.92 (27.1)	7.34 (50.7)	5.48 (37.8)	3.92 (27.1)
		Power Input		W	210					
	Water Side Heat Exchanger	Type			Brazed Plate					
		Quantity			1					
		Water volume		gal/m (l/min)	0.27 (1.01)					
		Water flow rate Min.		gal/m (l/min)	4.23 (16)					
		Water flow rate Nom.	Cooling (2)	gal/m (l/min)	–	–	–	7.58 (28.7)	9.45 (35.8)	9.90 (37.5)
			Heating (3)	gal/m (l/min)	8.47 (32.1)	10.59 (40.1)	12.12 (45.9)	8.47 (32.1)	10.59 (40.1)	12.12 (45.9)
		Water flow rate Max.	Cooling	gal/min (l/min)	15.3 (58)					
			Heating	gal/min (l/min)	15.3 (58)					

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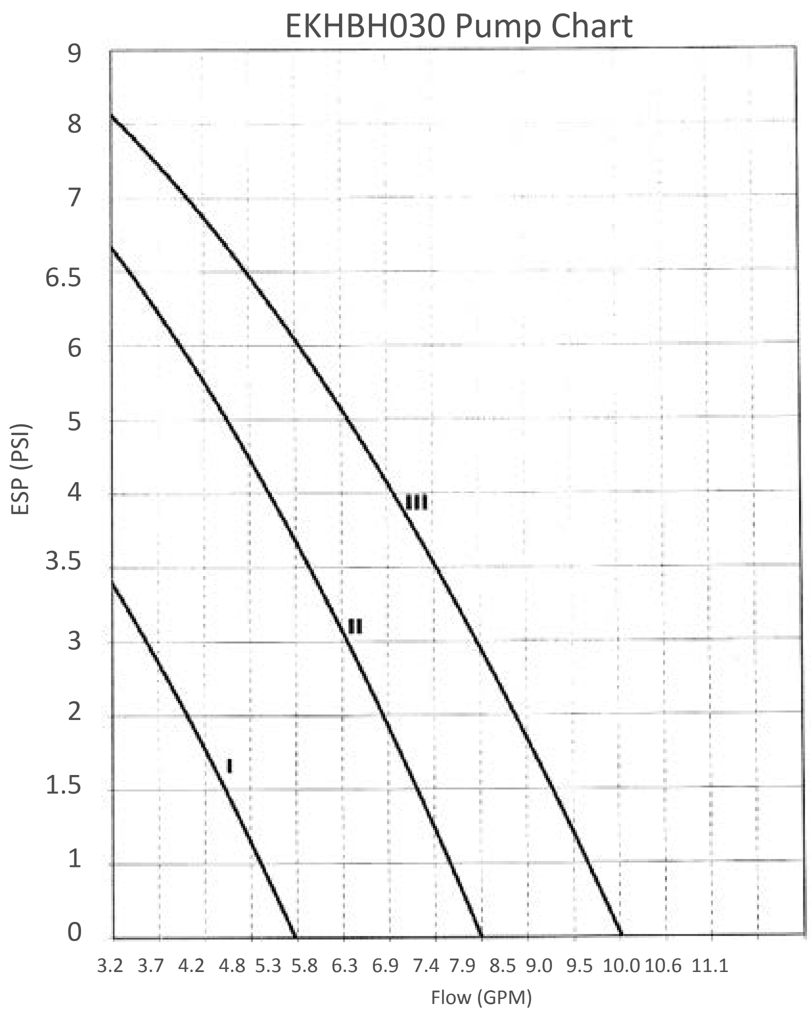
Daikin Altherma Flow and Pump ESP

- The Daikin Altherma Engineering Manual has pump charts for all models.
- These are useful when designing the distribution system so proper flow can be maintained.



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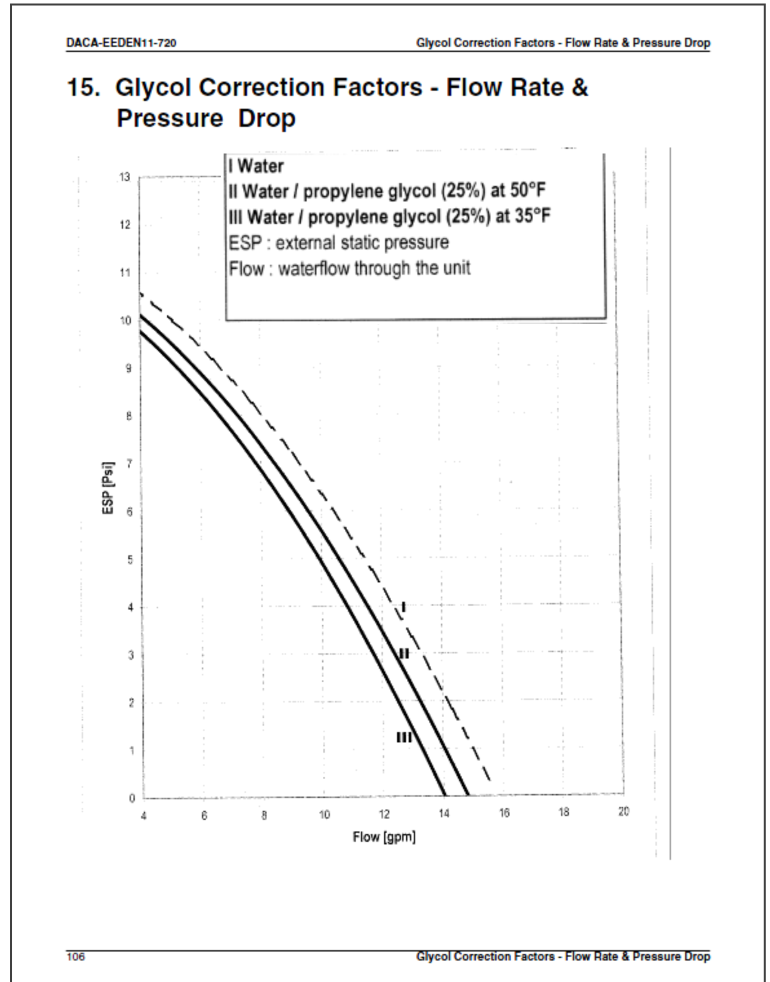
Glycol Considerations

- Glycol is recommended when ever water piping is located in areas that can drop below freezing or when installed in a location with frequent and long power outages (exceeding 2hrs.)
- When Glycol is used flow can be affected depending the percentage of concentration and outdoor temperature.
- The chart on the right shows the affects of 25% Glycol mixture.
- Only propylene type with a corrosive inhibitor should be used.


DACA-EEDEN11-720 Glycol Correction Factors - Flow Rate & Pressure Drop

15. Glycol Correction Factors - Flow Rate & Pressure Drop

106 Glycol Correction Factors - Flow Rate & Pressure Drop

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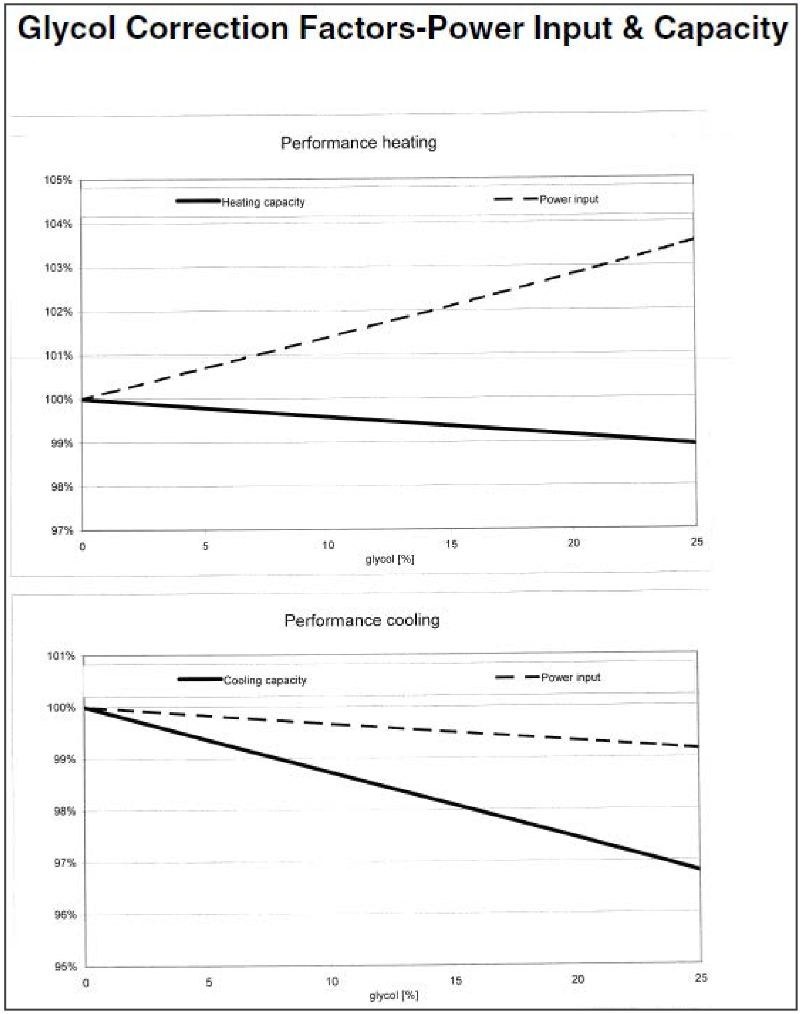
Glycol Correction Factors

- Glycol will affect the power input and capacity slightly.
- The charts at the right shows the effect on Heating and Cooling performance.



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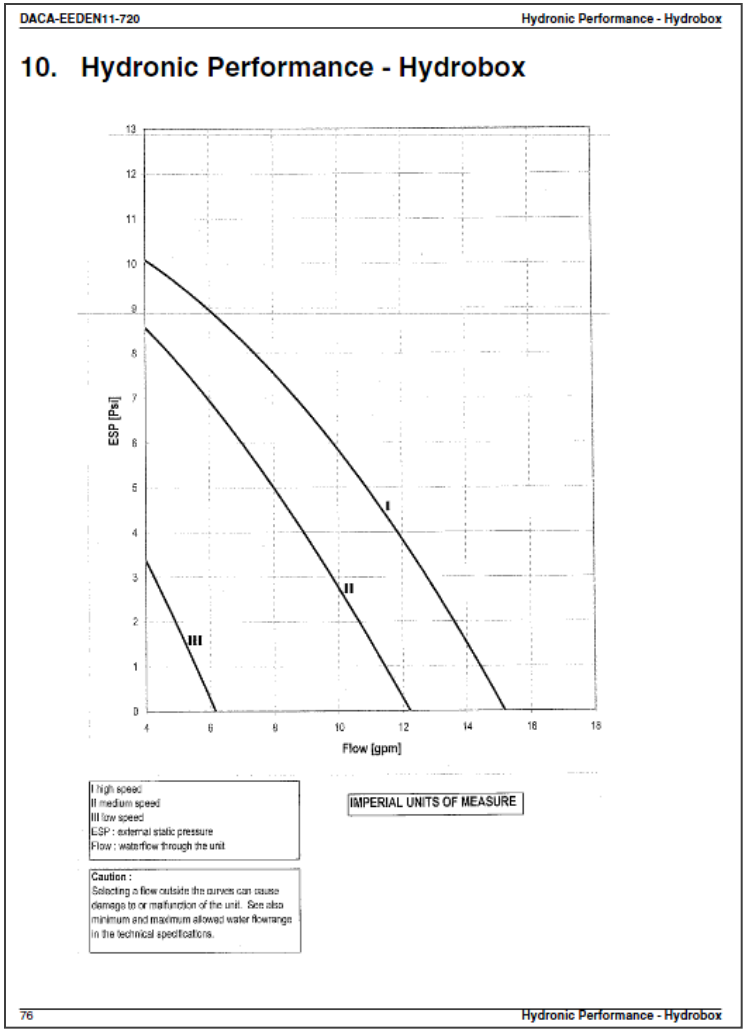
Pump Speed Selection

- The water distribution pressure drop cannot exceed the Daikin Altherma’s pump capabilities.
- If the total pressure drop (PD) is higher then the internal pump will allow a different piping system or piping material should be considered to accommodate the application requirements.
- In cases when the PD is higher than the Daikin Altherma’s pump is capable of, a Primary Secondary piping scenario is a good option.
- Select the pump speed to meet the design needs and pressure drop of the system.


DACA-EEDEN11-720 Hydronic Performance - Hydrobox

10. Hydronic Performance - Hydrobox

I high speed
II medium speed
III low speed
ESP : external static pressure
Flow : waterflow through the unit

IMPERIAL UNITS OF MEASURE

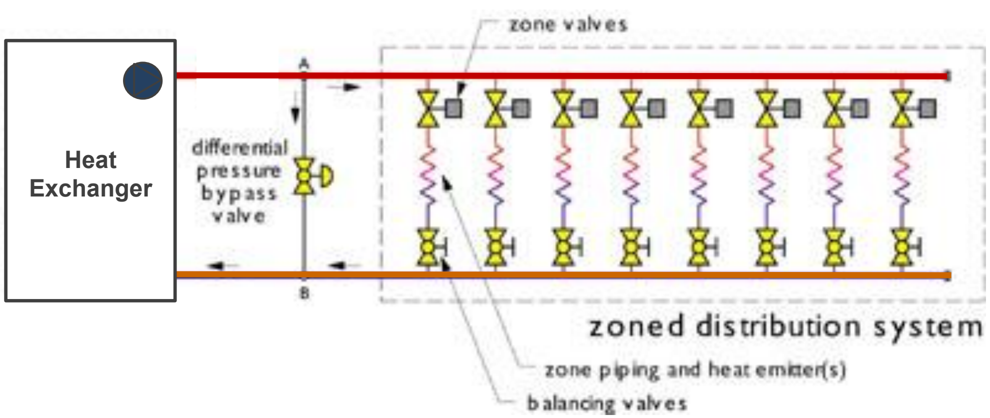
Caution : Selecting a flow outside the curves can cause damage to or malfunction of the unit. See also minimum and maximum allowed water flowrange in the technical specifications.

76 Hydronic Performance - Hydrobox

Pressure Differential By-pass

Pressure differential by-pass

- A By-pass can be used to maintain flow through the Daikin Altherma as zones open and close throughout the system.
- In the below example a By-pass is used to help maintain the required flow through the Daikin Altherma.
- The By-pass should be set so that when the zone with the lowest flow (GPM) is operating, flow through the Daikin Altherma is within its required limits.
- A manual ball valve is not an acceptable by-pass method.



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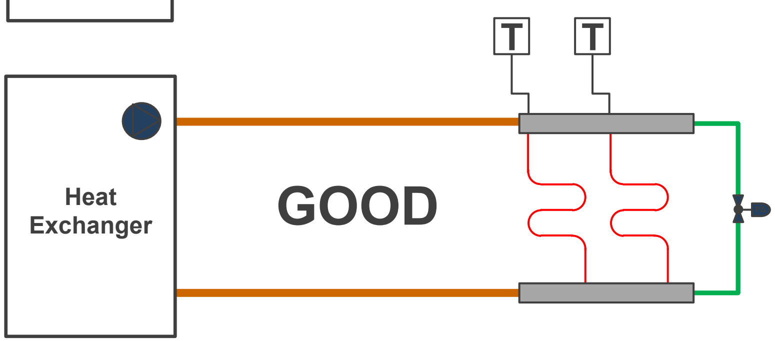
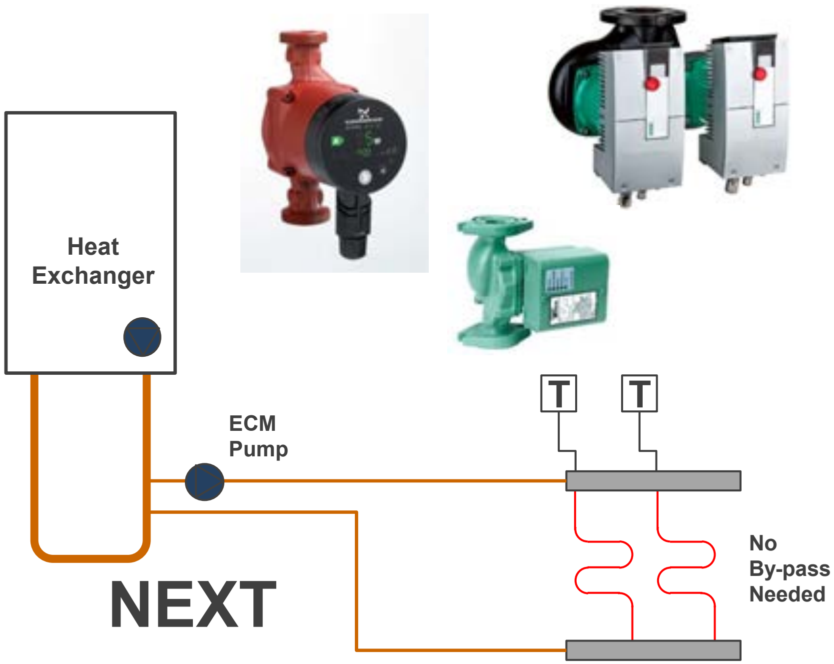
An Alternative to Pressure Differential By-pass Valves

Alternative to Pressure By-pass

- As ECM pumps get more popular new designs of piping strategies are starting to emerge that could not have been done before.
- Pump speeds up and slows down automatically to meet load requirements
  - Benefits:
    - Operation costs can be 2/3 single speed pumps
    - Unbeatable flow control





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Domestic Hot Water Tank Piping

- 1” water piping to DHW heat exchanger is required. Once at the tank field piping will be reduced to ¾” for the heat exchanger connections.
- BSP to NPT reducing fittings for these connections are available from Daikin, the fitting are 1” female NPT to ¾” male BSP.
- When a Domestic Hot Water tank (DHW) is connected to the Daikin Altherma two important water piping rules related to the location of the 3-way valve need to kept in mind while laying out the system.
- It is recommended that when piping the 3-way valve that the branch supplies water to the DHW tank so that there will be less flow restriction on the main piping loop. If this is done DHW tank affects piping Ft of Hd. very little.

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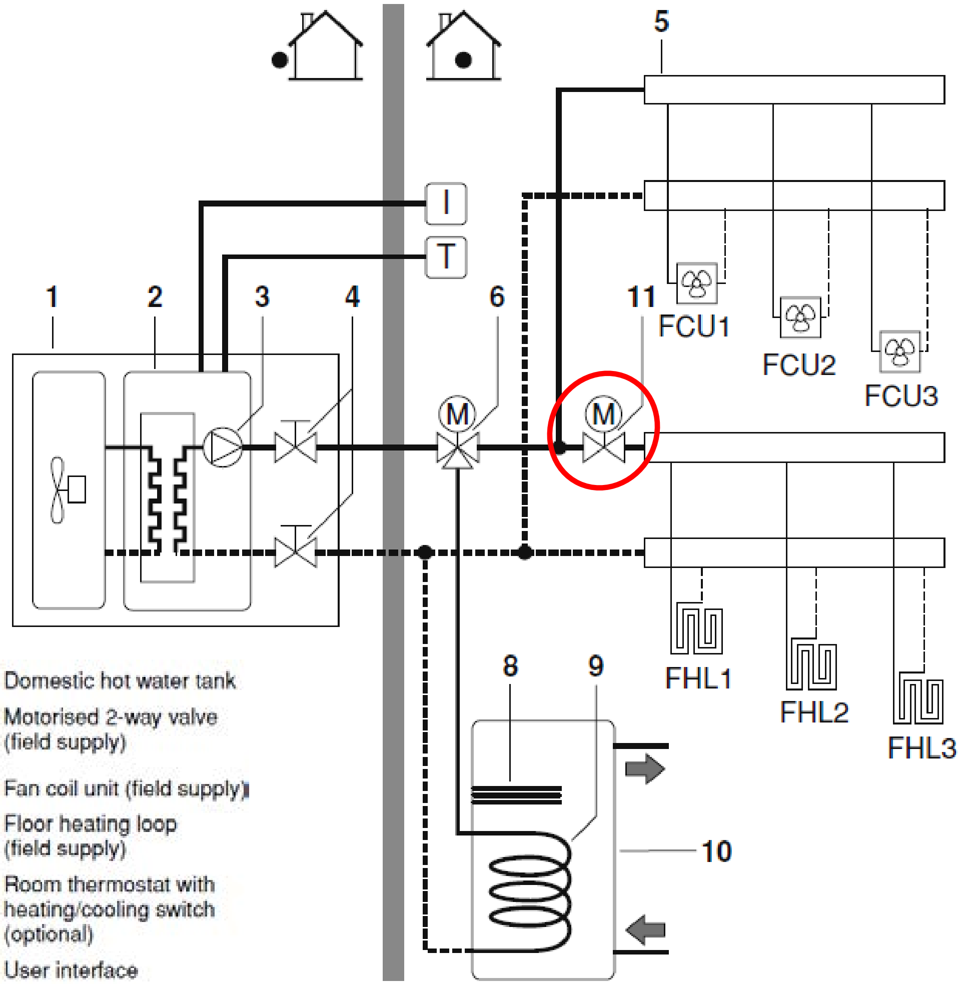
DHW Tank Requirements	Size 018, 024, 030	Size 036, 048, 054
Maximum allowable distance between 3-way valve and the MonoBloc/Hydro-box (only for installations with domestic hot water tank – 3-way valve supplied with domestic hot water tank).	10 ft (3 m)	10 ft (3 m)
Maximum allowable distance between the domestic hot water tank and the MonoBloc/Hydro-box (only for installations with domestic hot water tank). The thermistor cable supplied with the domestic hot water tank is 39.4 ft (12 m) in length.	32.8 ft (10 m)	32.8 ft (10 m)

2-way Valve for Cooling Mode

- If needed a 2-way valve (24VAC) can be installed and controlled by the Daikin Altherma in cases where there are separate cooling and heating devices.
- For example if a fan coil is used for cooling and radiant for heating, the 2-way valve will stop cooling water from flowing through the radiant floor.



1	Unit	10	Domestic hot water tank
2	Heat exchanger	11	Motorised 2-way valve (field supply)
3	Pump		
4	Shut-off valve	FCU1..3	Fan coil unit (field supply)
5	Collector (field supply)	FHL1..3	Floor heating loop (field supply)
6	Motorised 3-way valve (optional)	T	Room thermostat with heating/cooling switch (optional)
8	Booster heater		
9	Heat exchanger coil	I	User interface

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Misc. Devices

- Piping system may contain one of more of the following
  - Automatic air elimination devices
  - Shut off valves where needed
  - Zone purging valves
  - Balancing valves (circuit setters)
  - Hydronic separators
  - Drain valves
  - Zone valves
  - Radiant manifolds
- Install each based on the manufactures recommendations and best practices for hydronic water piping.

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Pre-Plan

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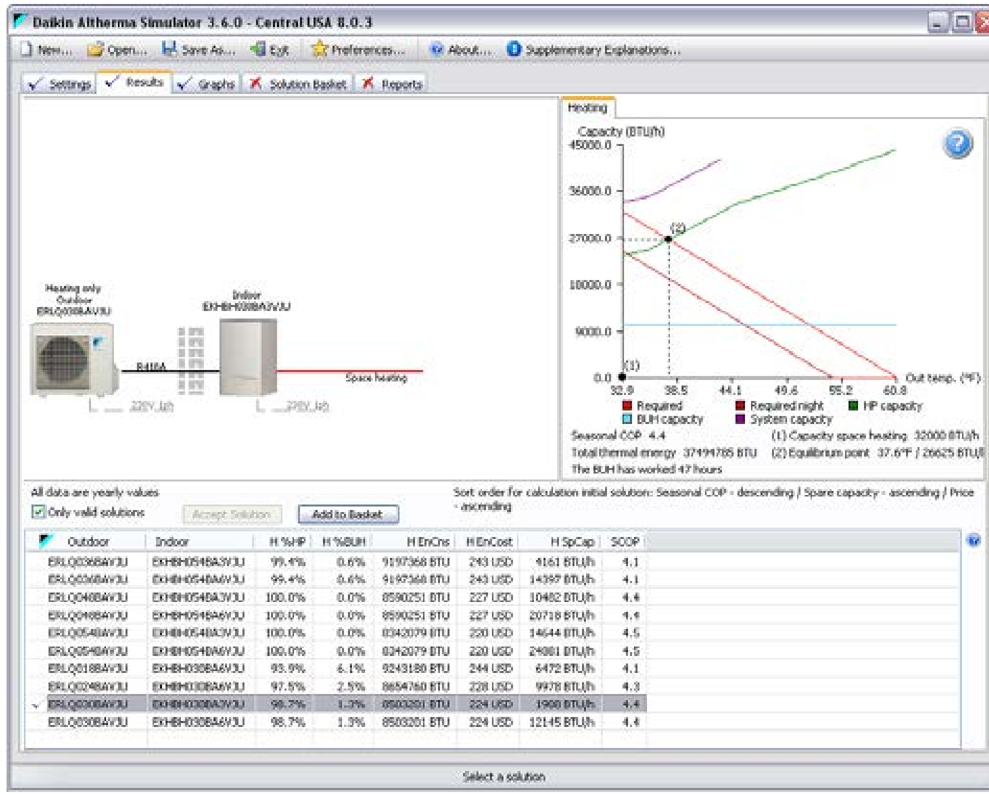
Piping Calculations

- The next few piping examples are about teaching pipe sizing basics not about how to apply.
- The numbers shown will work in some areas of North America, but not all do not use them as a guide on sizing Daikin Altherma equipment.
- As stated in the Pre-Installation course, after a Manual J/N is done the Daikin Altherma Selection Software can now be utilized for proper selection of equipment.



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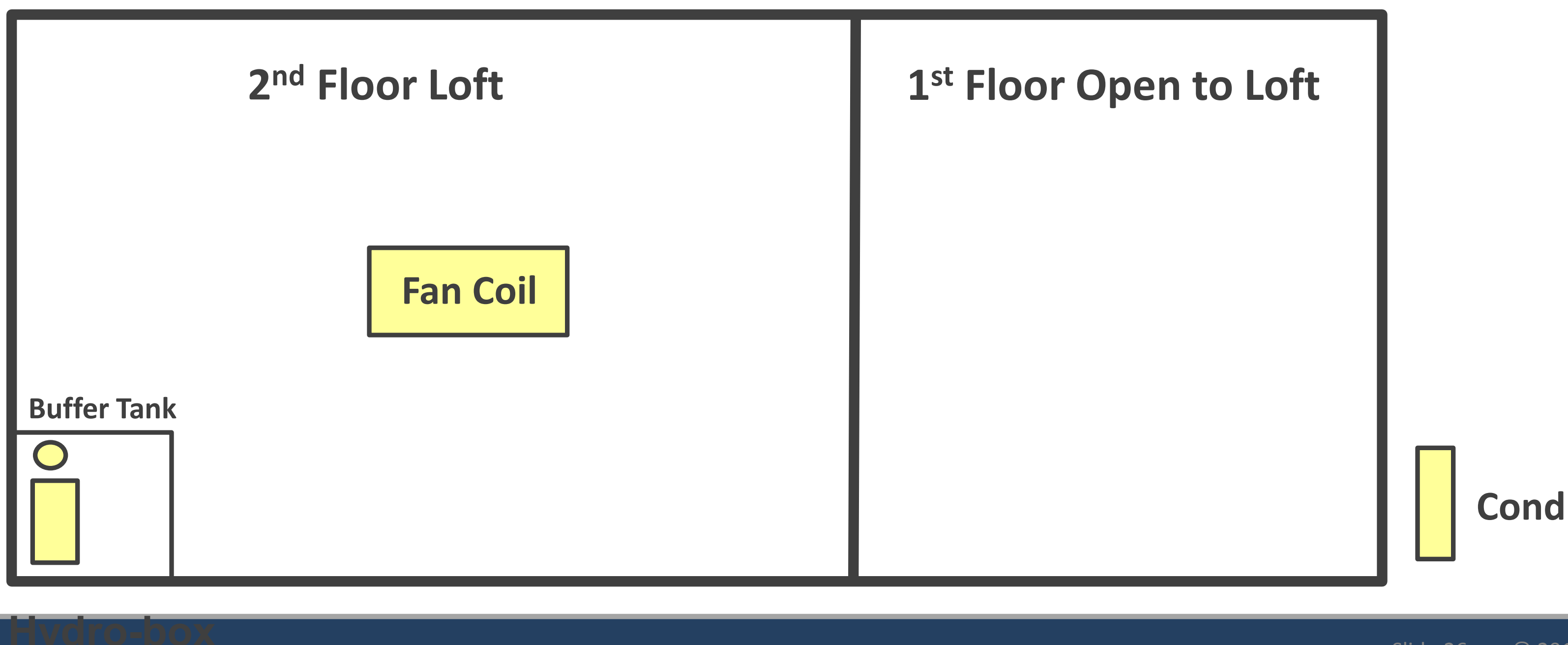
Piping Calculation – Example 1

- Heating only system with fan coil, sm. Split
  - Split level apartment/condo
  - Outside design conditions will be by-passed so just pipe sizing can be explained.
  - Fan Coil is 20 feet above Hydro-box
  - Load requirements – 32,000 BTU's
  - A buffer tank will be required to maintain minimum water volume



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Piping Calculation – Example 1 (cont.)

- Heating only system with fan coil, sm. split
  - Fan Coil is 20 feet above Hydro-box
  - To meet heat load requirements – 32 BTUH, 110˚F water @ 6 GPM will be used.

Unit Model	Nom. CFM	GPM (HTG)	PD (FT. Water)	Heating BTUH @ Entering Water Temp.					
				100 °F	105°F	110 °F	115 °F	120 °F	125 °F
EFWT030	1050	6.0	4.8	25.1	29.2	33.4	37.	41.8	45.9
		4.5	3.0	23.9	27.9	31.9	35.9	39.8	43.8
		3.0	1.5	22.1	25.8	29.5	33.1	36.8	40.5

  - PD of fan coil at these requirements is 4.8 Ft. of Hd.
  - The Daikin Altherma EKHBH030 nominal Heating ESP is 4.42 PSI, at this ESP the system will pump 6.37 GPM.

(see chart on right and more information found in Engineering Manual)

EKHBH030 / EFWT030

EKHBH030 / ERLQ030	
Nominal ESP HTG	4.42 PSI
Nominal Flow HTG	6.37 GPM
Minimum Flow	3.17 GPM
Maximum Flow	----
Minimum Water Volume	2.64 gal.

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Piping Calculation – Example 1 (cont.)

Heating only system with fan coil

- Chart A shows that if 1” copper is used and 6 GPM is the required flow rate, the pressure drop is 2.70 Ft of Hd. per 100 ft. of 1” copper tubing.
- There is 40’ of 1” pipe 40’ 1” – 40 ÷ 100 x 2.70 = 1.08 Ft. of Hd.
- In addition to the 40’ of 1” pipe there are
- 14 qty. 1” 90’s – 2.5 EPL
  - 14 x 2.5 = 35 EPL
- 6 qty. 1” Tee’s (flow-through) – 0.0 EPL
  - 0.0 = EPL
- 4 qty. 1” Ball Valves – 0.5 EPL
  - 4 x 0.5 = 2.0 EPL
- 1 qty. 5 gal. buffer tank 1” taps – 0.0 EPL
  - 1 x 0.0 = 0.0 EPL
- Total of fittings is 37 EPL (Chart B)
- 37 ÷ 100 x 2.70 = 1.0 Ft. of Hd.

Chart A

Fluid Flow Rate	Type M Copper Nominal Size	Type M Copper Per 100'
GPM	Inches	Ft. of Hd.
4	1	1.16
6	1	2.70
8	1	4.50
10	1	6.70

Chart B

Copper, values expressed in EPL							
Size	Elbows 90	Elbows 45	Couplings	Tees (flow-through)	Tees (branch)	Check Valves	Ball Valves (full port)
1”	2.5	1	0.0	0.0	4.5	4.5	0.5

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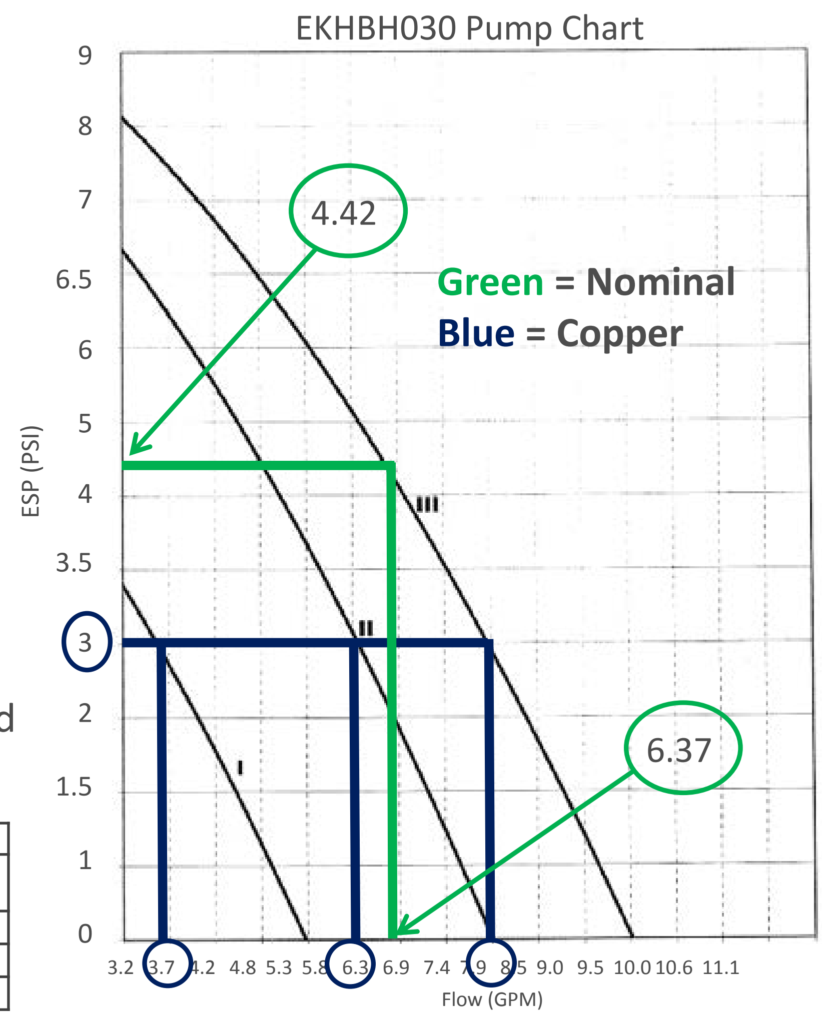
Piping Calculation – Example 1 (cont.)

Heating only system with fan coil

- Fan coil is 4.8 Ft. of Hd.
- Pipe total is 1.08 Ft. of Hd.
- Fitting Total is 1.0 Ft of Hd.

- Total Water Distribution System Ft of Hd.
  - 6.88 Ft of Hd. (Ft. of Hd. = PSI x 2.31)
  - 6.88 ÷ 2.31 = 3 PSI
- System required flow was 6 GPM
- Pump speed I will provide < 3.7 GPM, No Good
- Pump speed II will provide 5.8 GPM, Acceptable
- Pump speed III will provide 7.4 GPM, Acceptable
  - A balancing valve (circuit setter) should be used to set water flow to 6 GPM.

Unit Model	Nom. CFM	GPM (HTG)	PD (FT. Water)	Heating BTUH @ Entering Water Temp.					
				100 °F	105°F	110 °F	115 °F	120 °F	125 °F
EFWT030	1050	6.0	4.8	25.1	29.2	33.4	37.	41.8	45.9
		4.5	3.0	23.9	27.9	31.9	35.9	39.8	43.8
		3.0	1.5	22.1	25.8	29.5	33.1	36.8	40.5



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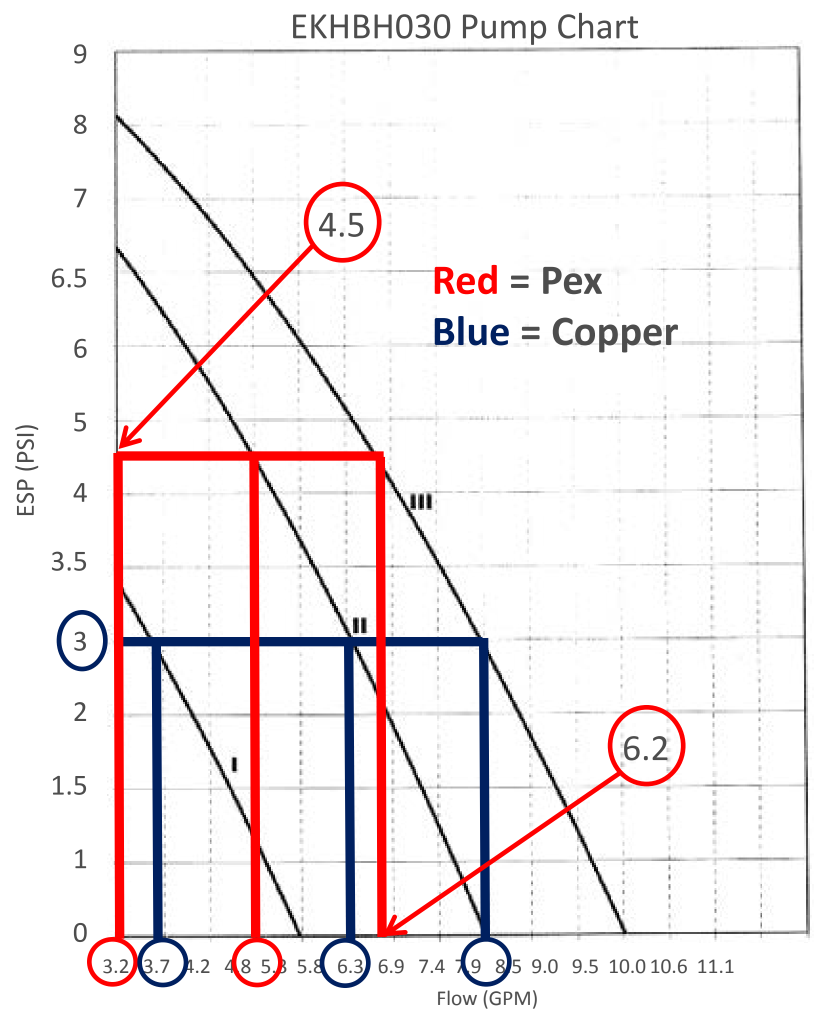
Piping Calculation – Example 1a

Copper vs. Pex

- If we change the same example from copper to Pex
  - Fan Coil = 4.8 Ft. of Hd.
  - Pex Piping = 2.0 Ft. Hd. (Copper = 1.08)
  - Pex Fittings = 3.5 Ft. of Hd. (Copper = 1.0)
- Total Water Distribution System Ft of Hd. 10.3 Ft of Hd. (4.5 psi) (Copper = 6.88)
- System required flow was 6 GPM
- Pump speed I will provide < 3.2 GPM, No Good
- Pump speed II will provide 4.8 GPM, No Good
- Pump speed III will provide 6.2 GPM, Acceptable



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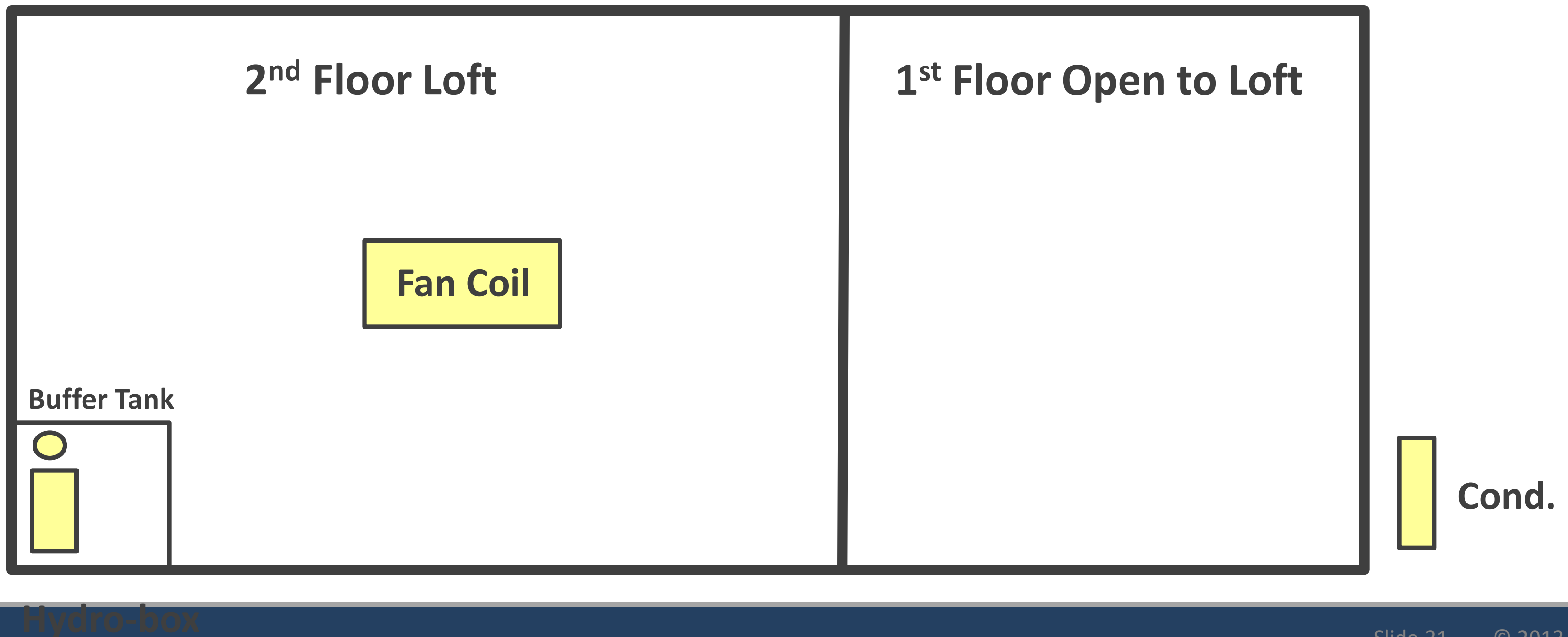
Piping Calculation – Example 2

- Heating only system with fan coil, sm. Split
  - Split level apartment/condo
  - Outside design conditions will be by-passed so just pipe sizing can be explained.
  - Fan Coil is 20 feet above Hydro-box
  - Load requirements – 55,000 BTU's
  - A buffer tank will be required to maintain minimum water volume



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Piping Calculation – Example 2 (cont.)

- Same as Example 1, but with lg. split
  - Fan Coil is 20 feet above Hydro-box
  - To meet load requirements – 55 BTUH, 110˚F water @ 7 GPM will be used.

Unit Model	Nom. CFM	GPM (HTG)	PD (FT. Water)	Heating BTUH @ Entering Water Temp.					
				100 °F	105°F	110 °F	115 °F	120 °F	125 °F
EFWT060	2000	12.0	10.9	46.8	54.6	62.4	70.2	78.0	85.8
		10.0	7.9	45.6	53.3	60.9	68.5	76.1	83.7
		7.0	4.3	43.0	50.1	57.3	64.5	71.6	78.8

  - PD of fan coil at these requirements is 4.3 Ft. of Hd.
  - The Daikin Altherma EKHBH054 nominal Heating ESP is 3.92 PSI, at this ESP the system will pump 12.12 GPM. (see chart on right and more information found in Engineering Manual)

EKHBH054 / EFWT060

EKHBH054 / ERLQ060	
Nominal ESP HTG	3.92 PSI
Nominal Flow HTG	12.12 GPM
Minimum Flow	4.23 GPM
Maximum Flow	15.3 GPM
Minimum Water Volume	5.28 gal.

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Piping Calculation – Example 2 (cont.)

Heating only system with fan coil

- Chart A shows that if 1” copper is used and 8 GPM is the required flow rate, the pressure drop is 4.5 Ft of Hd. per 100 ft. of 1” copper pipe.
- There is 40’ of 1” pipe.
  - 40’ qty. 1” – 40 ÷ 100 x 4.5 = 1.8 Ft. of Hd.
- In addition to the 35’ of 1” pipe there are
- 14 qty.1” 90’s – 2.5 EPL
  - 14 x 2.5 = 35 EPL
- 6 qty. 1” Tee’s (flow-through) – 0.0 EPL
  - 6 x 0.0 = 0.0 EPL
- 4 qty. 1” Ball Valves – 0.5 EPL
  - 4 x 0.5 = 2.0 EPL
- 1 qty. 5 gal. buffer tank 1” taps – 0.0 EPL
  - 1 x 0.0 = 0.0 EPL
- Total of fittings is 37 EPL (Chart B)
- 37 ÷ 100 x 4.5 = 1.67 Ft. of Hd.

Chart A

Fluid Flow Rate	Type M Copper Nominal Size	Type M Copper Per 100'
GPM	Inches	Ft. of Hd.
8	1	4.5
10	1	6.7
12	1.25	3.38
14	1.25	4.48

Chart B

Copper, values expressed in EPL							
Size	Elbows 90	Elbows 45	Couplings	Tees (flow-through)	Tees (branch)	Check Valves	Ball Valves (full port)
1”	2.5	1	0.0	0.0	4.5	4.5	0.5

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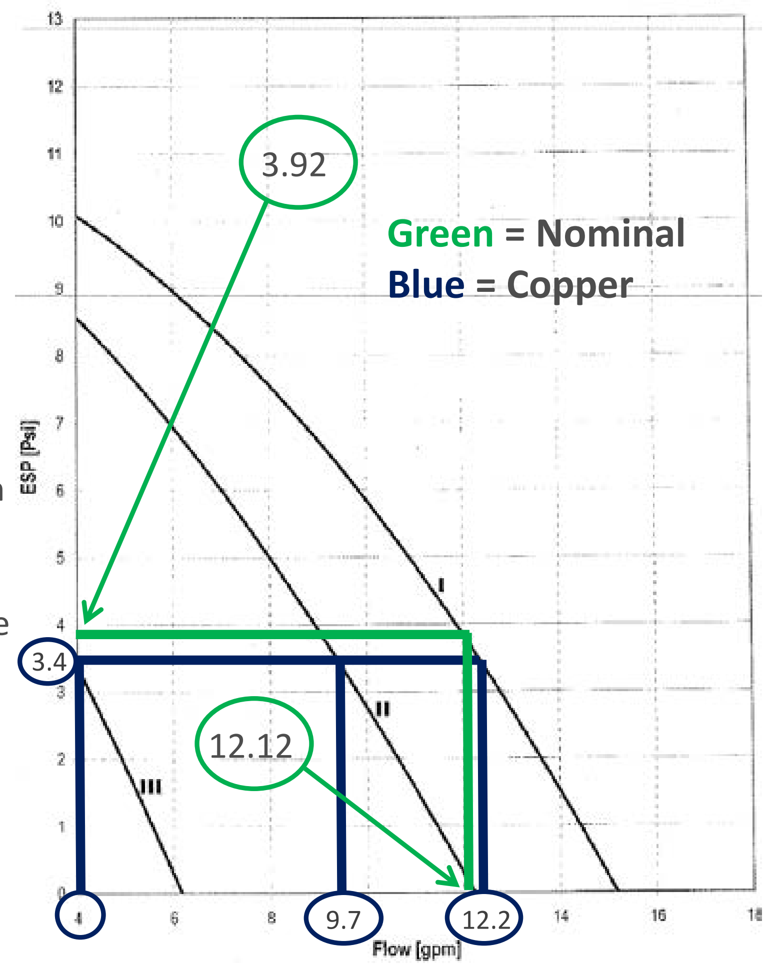
Piping Calculation – Example 2 (cont.)

Heating only system with fan coil

  - Fan coil is 4.3 Ft. of Hd.
  - Pipe total is 1.8 Ft. of Hd.
  - Fitting Total is 1.67 Ft of Hd.
- Total Water Distribution System Ft of Hd.
  - 7.77 Ft of Hd. (3.4 psi)
- System required flow was 7 GPM
- Pump speed III will provide < 4.0 GPM, No Good
- Pump speed II will provide 9.7 GPM, Possible
- Pump speed I will provide 12.2 GPM, Possible
- Speed II and I are possible even though the GPM is higher then the design of 7 GPM. A differential pressure by-pass would be recommended so nominal flow would be maintained in Daikin Altherma and fan coil required flow could be maintained at the same time.

Unit Model	Nom. CFM	GPM (HTG)	PD (FT. Water)	Heating BTUH @ Entering Water Temp.					
				100 °F	105°F	110 °F	115 °F	120 °F	125 °F
EFWT060	2000	12.0	10.9	46.8	54.6	62.4	70.2	78.0	85.8
		10.0	7.9	45.6	53.3	60.9	68.5	76.1	83.7
		7.0	4.3	43.0	50.1	57.3	64.5	71.6	78.8

EKHBH054 Pump Chart

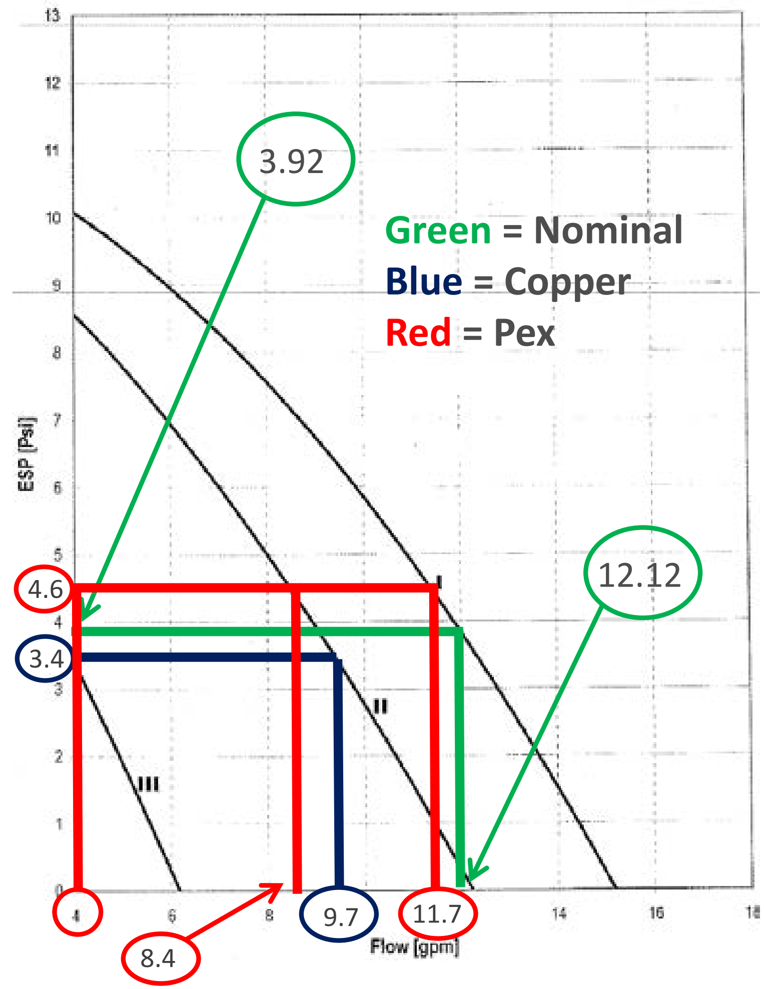


Piping Calculation – Example 2a

Copper vs. Pex

- If we change the same example from copper to Pex
- Pex will have to be upsized to 1¼" to meet flow requirements of 8 GPM
  - Fan Coil = 4.3 Ft. of Hd.
  - Pex Piping = 1.28 Ft. Hd.
  - Pex Fittings = 5.14 Ft. of Hd.
- Total Water Distribution System Ft of Hd.
  - 10.72 Ft of Hd. (4.64 psi)
- System required flow was 7 GPM
- Pump speed III will provide < 4.0 GPM, No Good
- Pump speed II will provide 8.4 GPM, Acceptable
- Pump speed I will provide 11.7 GPM, Possible
- Speed I is possible even though the GPM is higher then the design of 7 GPM. A differential pressure by-pass and balancing valve would be recommended so nominal flow would be maintained in the Daikin Altherma and fan coil's required flow could be maintained at the same time.

EKHBH054 Pump Chart



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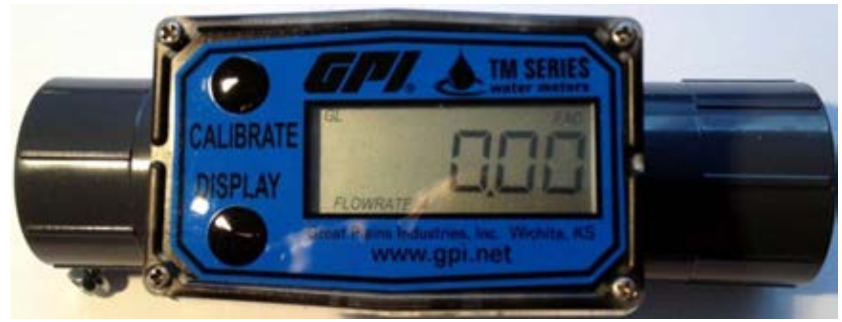
Piping Calculation – Tattletales

Digital Flow Meters



Caleffi Quicksetter Balancing Valve

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Great Pipe Sealants

Blue Monster Tape

Permabond MM115 Pure

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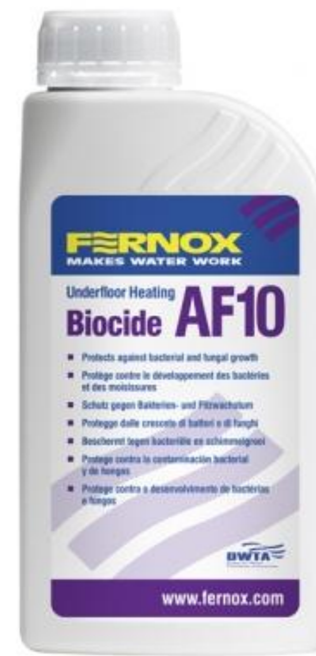
Furnox Water Treatment and Filtering

Installer Pack



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For more detailed information check Daikin's Engineering, Installation, Operation and Service manuals.
Available at www.daikinac.com

Thank You

DAIKIN AC®

absolute comfort

Never an uncomfortable moment.

Daikin Altherma Quick Startup & Reference Guide

Ver. 2.4

Table of Contents

Table of Contents (cont.)

Page

Preface

This handbook is intended for use as an aid to Field Service Technician with general technical knowledge and training on Daikin equipment. If the Field Service Technician does not have any (or limited) technical knowledge and training on Daikin equipment, do not attempt to install, commission or service any Daikin product with this handbook. Instead, the servicer needs to complete training offered by Daikin AC (Americas), Inc. ("Daikin AC") before attempting any installation, commissioning or service of the Daikin product.

This reference handbook is available for Field Service Technicians as a simplistic reference guide for commissioning. It is not intended to be a substitute for the Daikin Installation and Service Manuals or for training offered by Daikin AC.

We assume the Field Service Technicians using this handbook are fully qualified to work on the Daikin equipment.

This handbook is intended as a demonstrative aid only. It is not intended as a substitute for training offered by Daikin AC. Anyone installing Daikin equipment should first review the unit and inspect and evaluate the location where the unit is to be installed. Every installation varies in its individual circumstances and the Field Service Technician will have to use their professional judgment in each installation.

Should you require further assistance contact your local Daikin Service Champion at your local Rep or Distributor.

This publication was created by Stephen Meurs – National Manager – Technical Services

January 2013

Who to Contact for Help

If at any time during the startup procedure you require assistance, contact your local Daikin Service Champion at your local Rep or Distributor where the equipment was purchased.

Daikin Altherma Small Split Unit Models

Hydrobox

Condenser

ERLQ018BAVJU

ERLQ024BAVJU

ERLQ030BAVJU

Heat Only

EKHBH030BA3VJU

EKHBH030BA6VJU

Heat/Cool

EKHBX030BA3VJU

EKHBX030BA6VJU

Daikin Altherma Large Split Unit Models

Condenser

ERLQ036BAVJU

ERLQ048BAVJU

ERLQ054BAVJU

Hydrobox

Heat Only

EKHBH054BA3VJU

EKHBH054BA6VJU

Heat/Cool

EKHBX054BA3VJU

EKHBX054BA6VJU

Daikin Altherma MonoBloc Unit Models

Heat Only	Heat/Cool
EDLQ036BA6VJU	EBLQ036BA6VJU
EDLQ048BA6VJU	EBLQ048BA6VJU
EDLQ054BA6VJU	EBLQ054BA6VJU

Daikin Altherma Fan Coil Unit Models

120 Volt ECM	120 Volt PSC
EFWT018AEVLU (024)	EFWT018APVLU (024)
EFWT024AEVLU	EFWT024APVLU
EFWT030AEVLU (036)	EFWT030APVLU (036)
EFWT036AEVLU	EFWT036APVLU
EFWT048AEVLU	EFWT048APVLU
EFWT060AEVLU	EFWT060APVLU

Up flow, horizontal left & right

EFWT018 (Air flow modified EFWT024)

EFWT030 (Air flow modified EFWT036)

120 Volt AC – No Factory Installed Electric Heat Option Available

Daikin Altherma Fan Coil Unit Models (cont.)

208-240 Volt ECM	Factory Installed Heat Options
EFWT018AEVJU (024)	0, 5, 10kW
EFWT024AEVJU	0, 5, 10kW
EFWT030AEVJU (036)	0, 10, 15kW
EFWT036AEVJU	0, 10, 15kW
EFWT048AEVJU	0, 15, 20, 25kW
EFWT060AEVJU	0, 15, 20, 25kW

Up flow, horizontal left & right

EFWT018 (Air flow modified EFWT024)

EFWT030 (Air flow modified EFWT036)

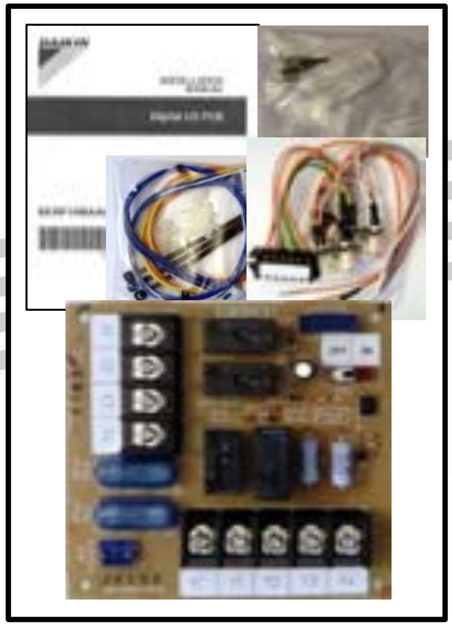
Factory installed electric heat option only, cannot be field installed

Daikin Altherma Optional Accessories

Domestic Hot Water (DHW) Tank

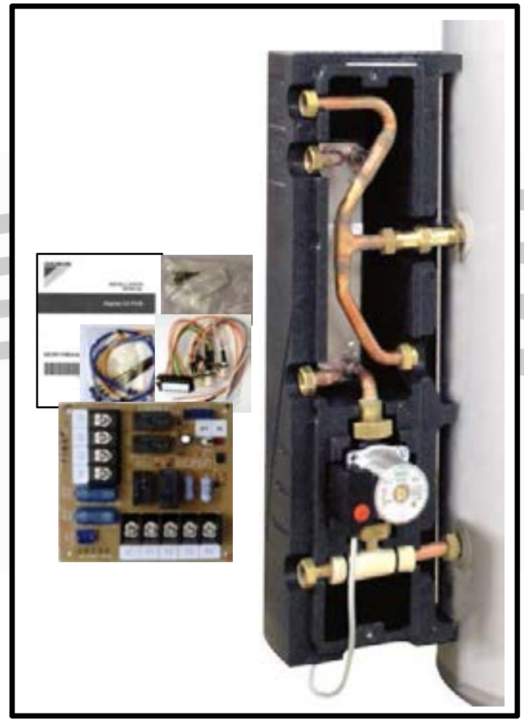
EKHWS050BA3VJU

EKHWS080BA3VJU



Digital I/O PCB

EKRP1HBAAU



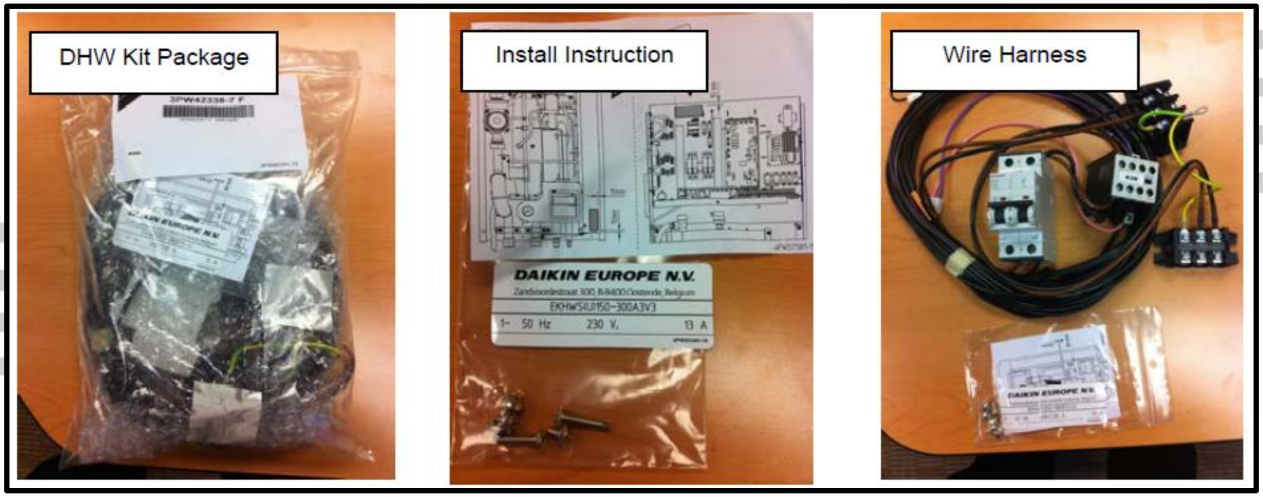
Solar Kit for DHW Tank

EKSOLHWBAVJU

(Includes EKRP1HB I/O PCB)

Daikin Altherma Optional Accessories (cont.)

DACA-DHW-KIT-1 – 3rd Party Domestic Hot Water Tank Kit



Contents:

1. Thermistor Assy. – Connects to X9A (Main PCB)
2. Booster Heater Connector Assy. K3M – Mounted to hydro section
3. Booster Heater Fuse/Breaker Assy. F2B – Mounted to hydro section
4. Tapping Screw (qty.): M4 x 8(4)
5. Tapping Screw (qty.): DIN7516(2)
6. Accessory Bag (Power Supply Sticker)

3-way valve is sold separately or can be field supplied. (24 VAC 100mA max.)

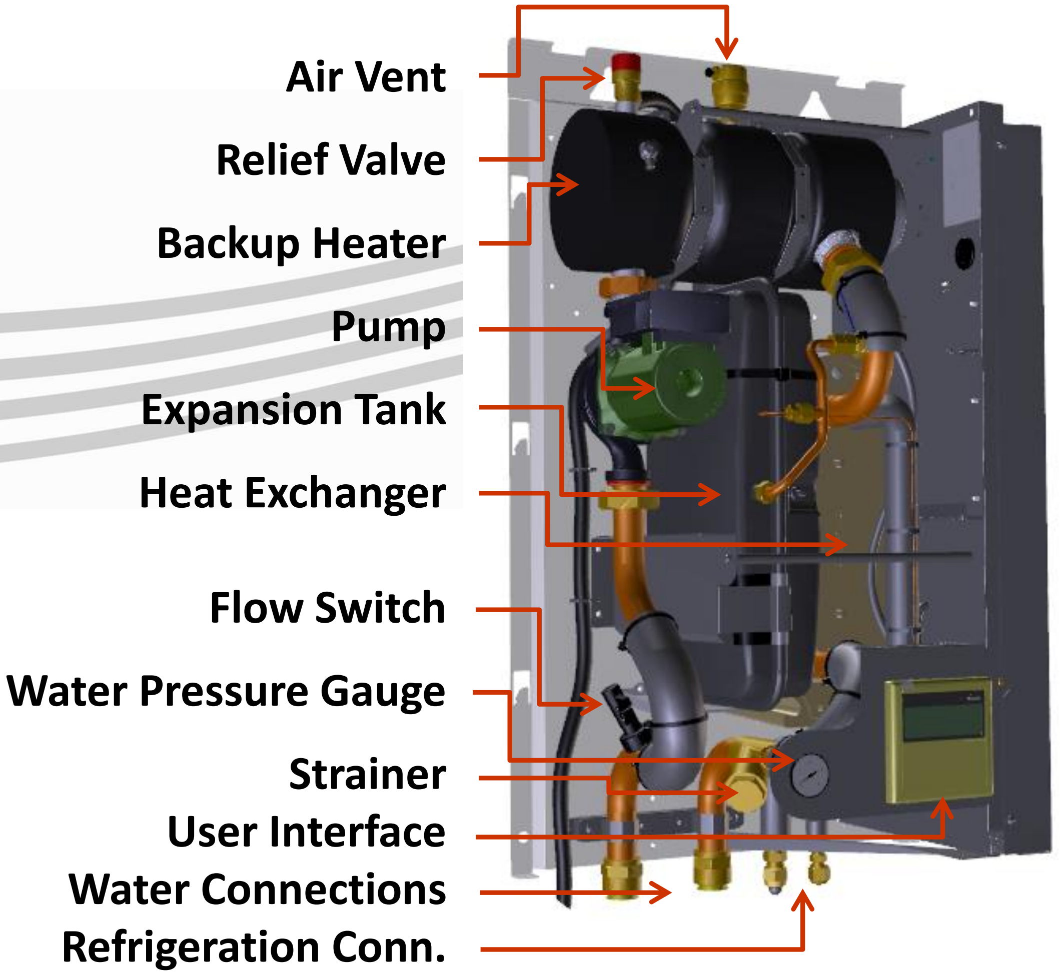
Daikin Altherma Optional Accessories (cont.)


BSP/NPT Adapter Kits


Cooling Drain Pan Kit
EKHBDP

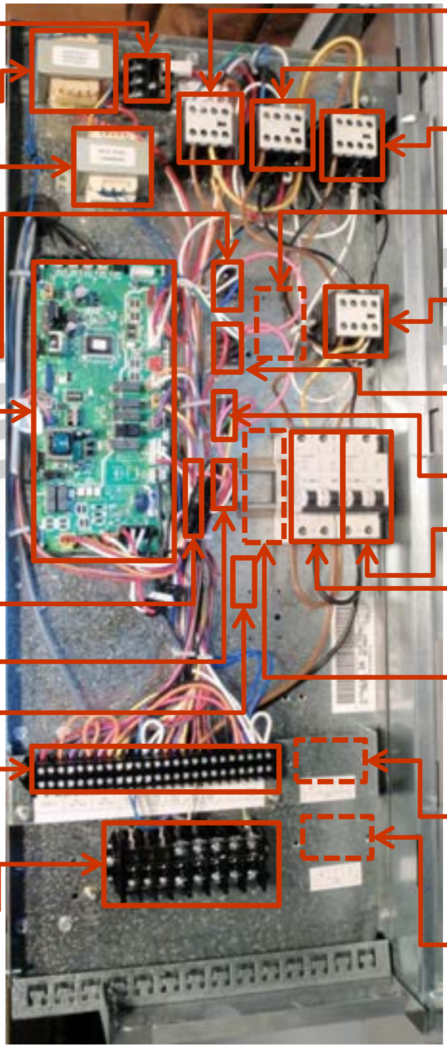
EKRTWA

Internal Component Layout – Hydrobox



Internal Component Layout – Hydrobox

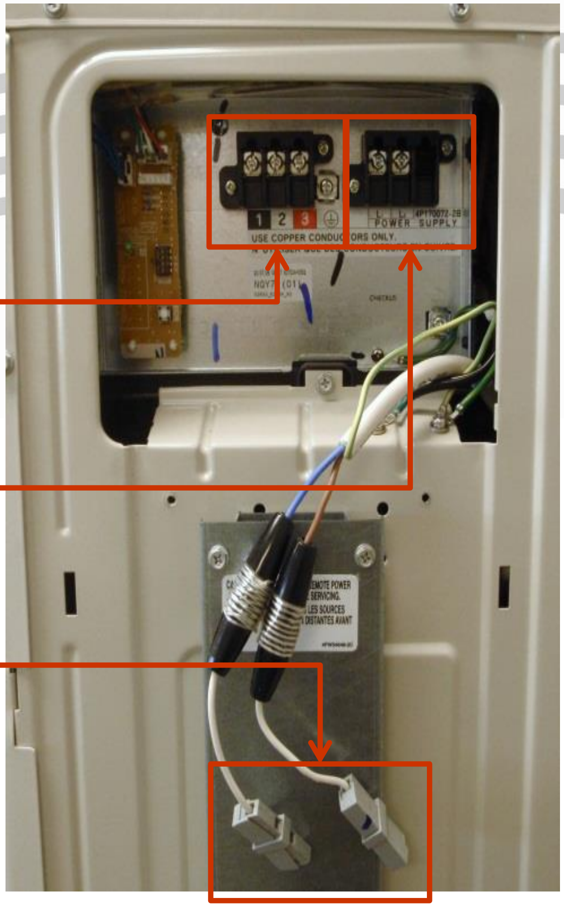
X8M – Power Input
TR1 – Transformer 24VAC for Main PCB (AP1)
TR2 – Transformer 24 VAC For Relays & Valves
K4A – Cooling Relay (1st Set Point)
A1P – Main PCB
FU2 & FU3 Fuses
K2A – 2-way Valve Relay
K4M – Pump Relay (054 only)
X2M Terminal Block
X1M Terminal Block



K1M – Backup Heater Relay (BUH)
K2M – Backup Heater Relay (BUH)
K5M – Backup Heater Relay (BUH)
K3M – Booster Heater Relay (BSH) DHW Option
K6M – Backup Heater Relay
K3A – Heating Relay (2nd Set Point)
K1A – 3-way Valve Relay
F1B – BUH Circuit Breaker
F3B – BUH Circuit Breaker
F2B – BSH Circuit Breaker – DHW Tank Option
X4M Terminal Block – DHW Tank Option
X3M Terminal Block – DHW Tank Option

Note: Due to DHW breaker being field installed, service tech should always confirm power off with meter before servicing.

ERLQ018~030BA Condenser Connections



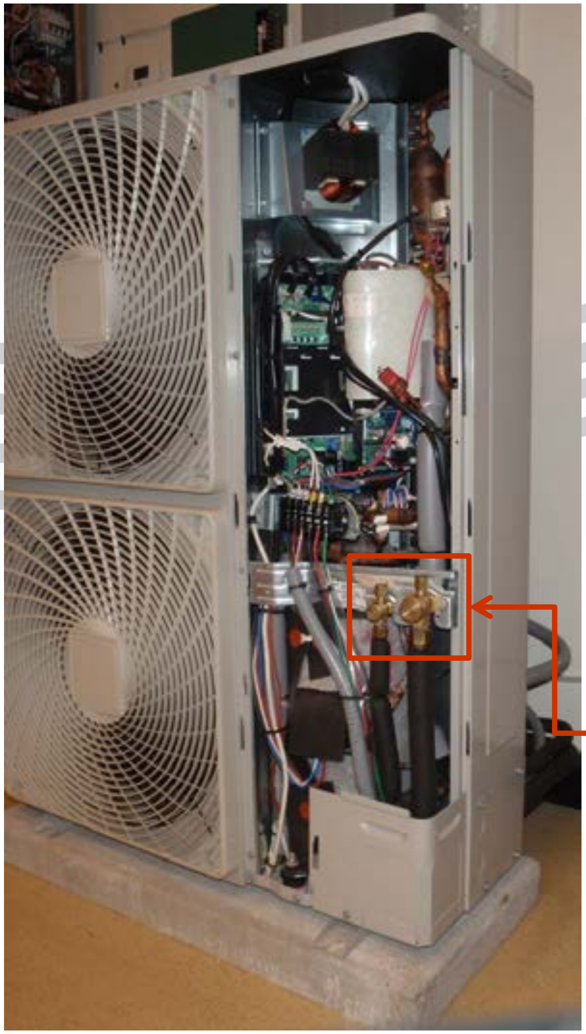
X2M Terminal Block
Communication to
Hydrobox

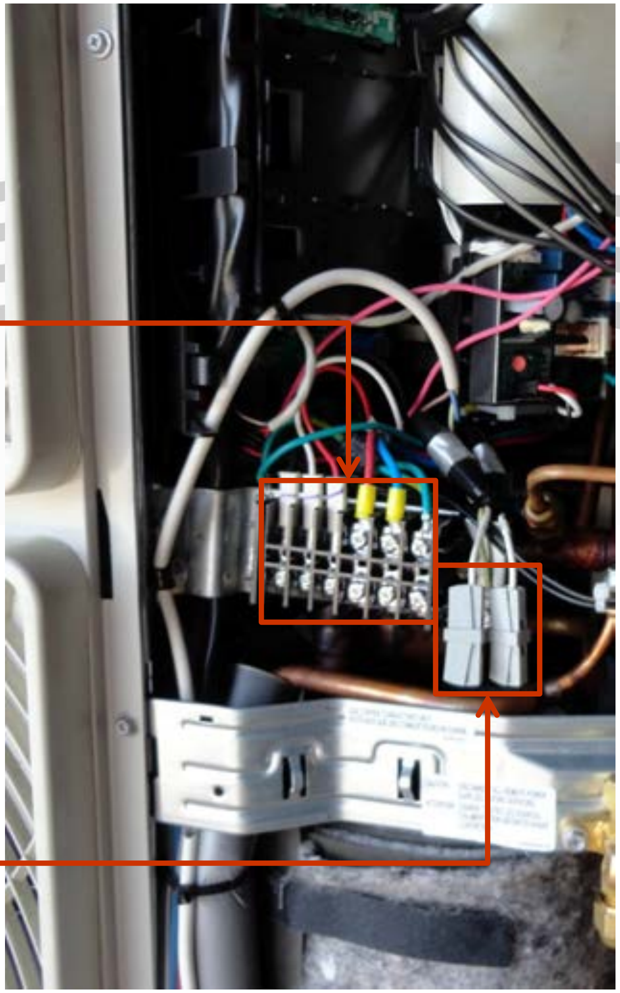
X1M Terminal Block
Power Supply for
Condenser

X1Y Bottom Plate Heater

Refrigerant Connections

ERLQ036~054BA Condenser Connections





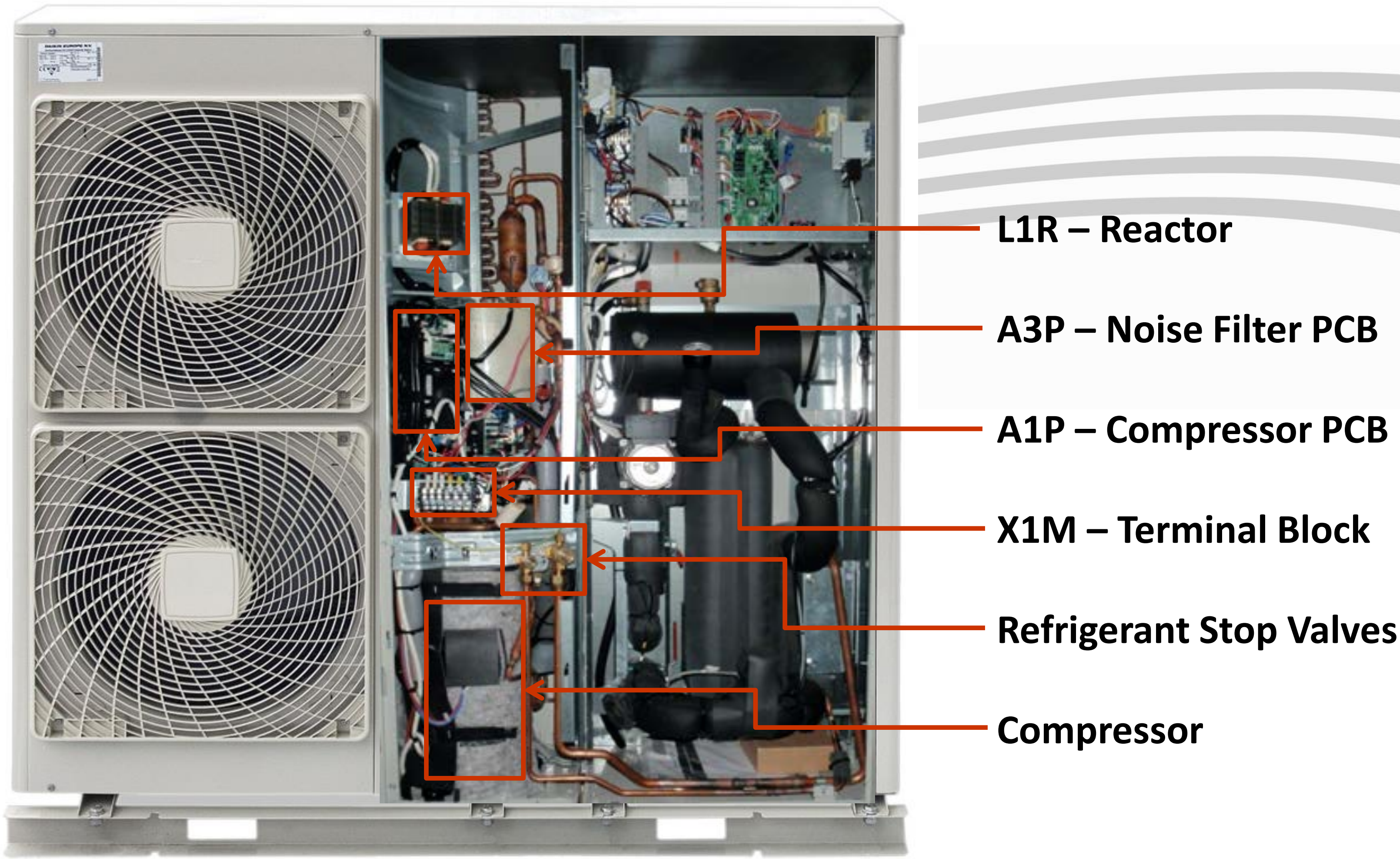
X1M Terminal Block Power Supply for Condenser & Communication to Hydrobox

Refrigerant Connections

X1Y Bottom Plate Heater

Internal Component Layout – MonoBloc

ED(B)LQ036/48/54BAVJU Compressor Compartment

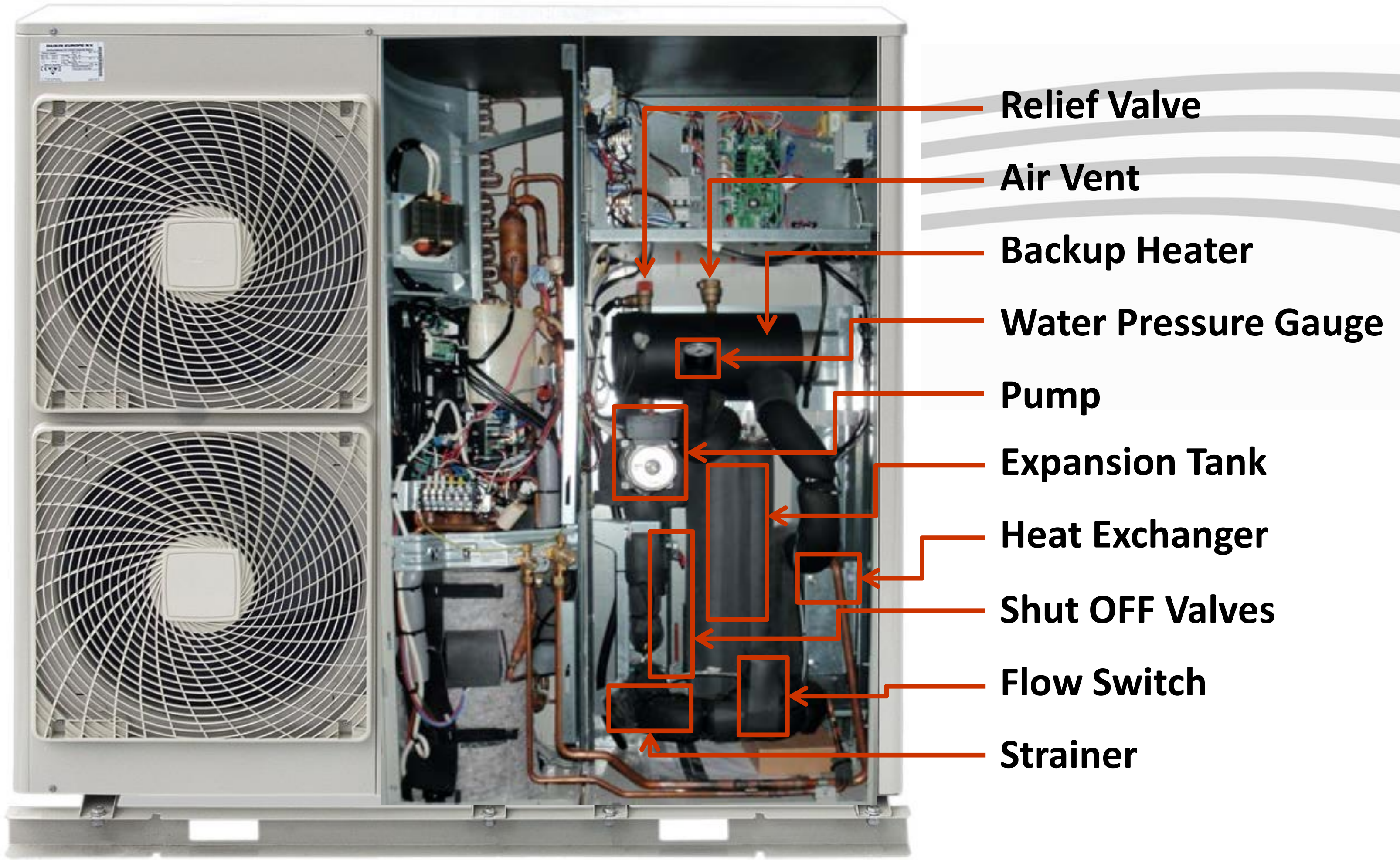


DAIKIN altherma

R-410A INVERTER

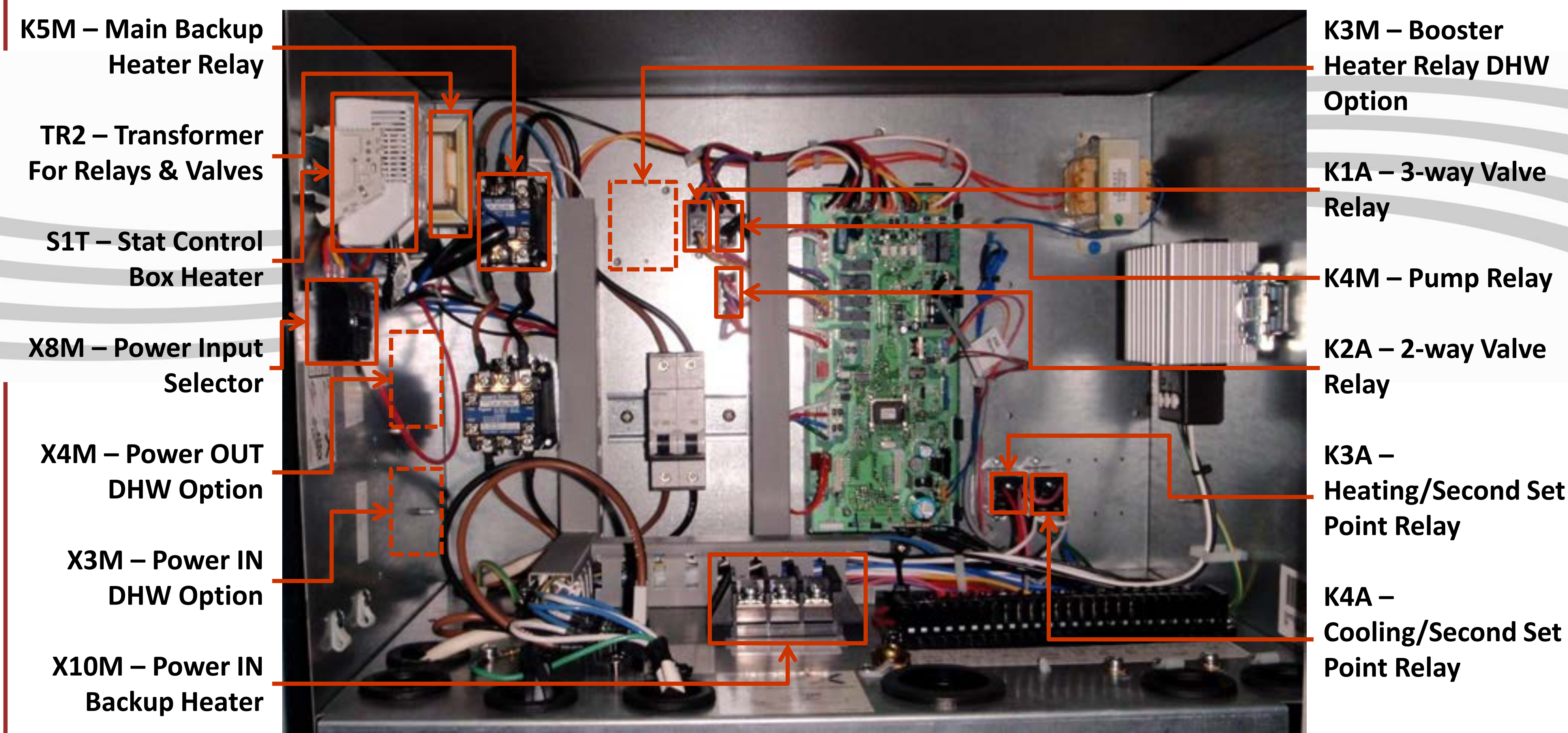
Internal Component Layout – MonoBloc

ED(B)LQ036/48/54BAVJU Hydronic Compartment



MonoBloc Control Box Layout

ED(B)LQ036/48/54BAVJU Control Box



Note: Due to DHW breaker being field installed, service tech should always confirm power off with meter before servicing.

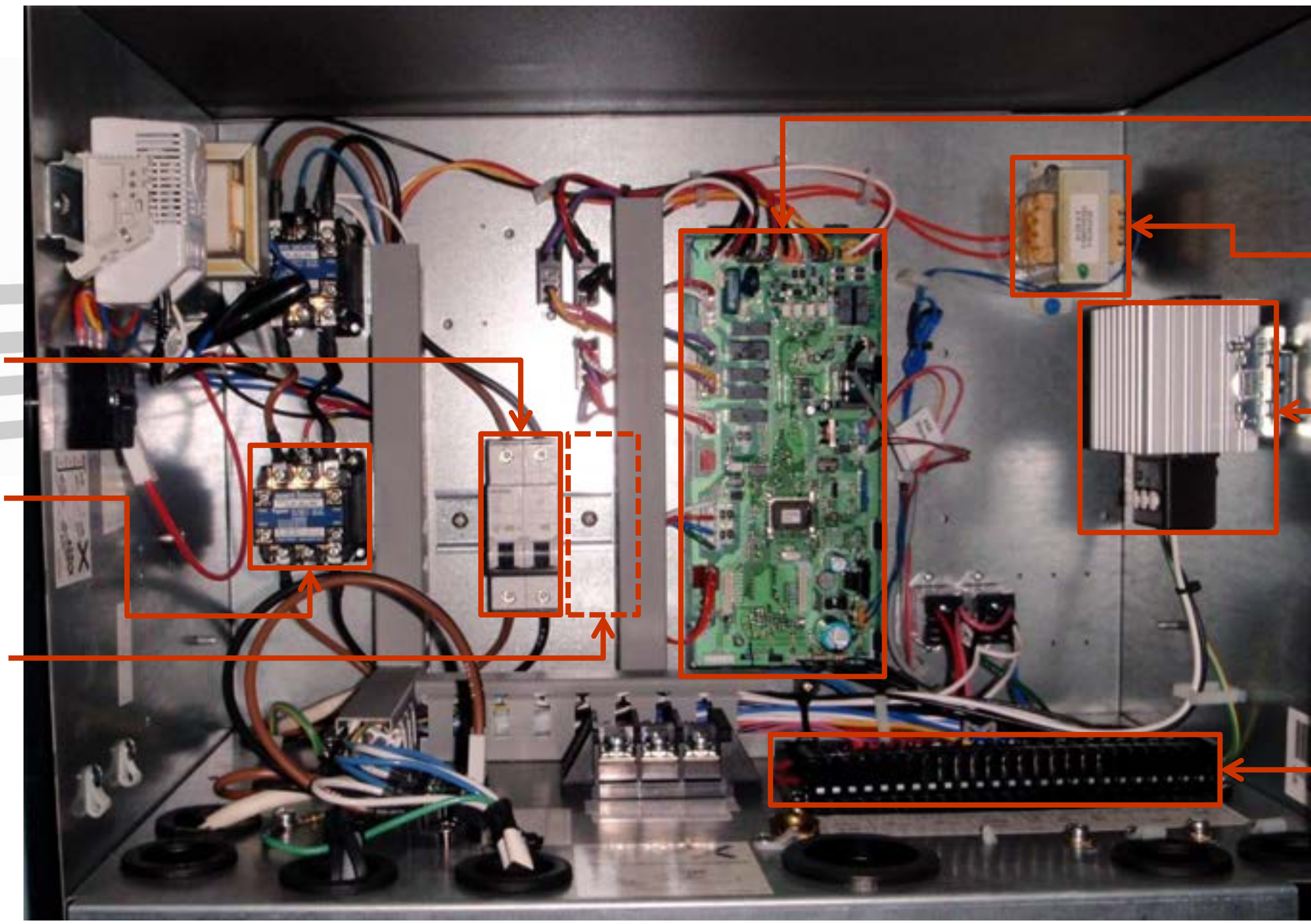
MonoBloc Control Box Layout

ED(B)LQ036/48/54BAVJU Control Box (cont.)

F1B – Backup Heater Breaker

K1M – Backup Heater Step Relay

F2B – 3kW Booster Heater Breaker DHW Option



A11P – Main PCB

TR1 – Transformer 24VAC for Main PCB (A11P)

E5H – Control Box Heater

X2M – Terminal Block

Note: Due to DHW breaker being field installed, service tech should always confirm power off with meter before servicing.

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Control Box – X2M Terminal Block

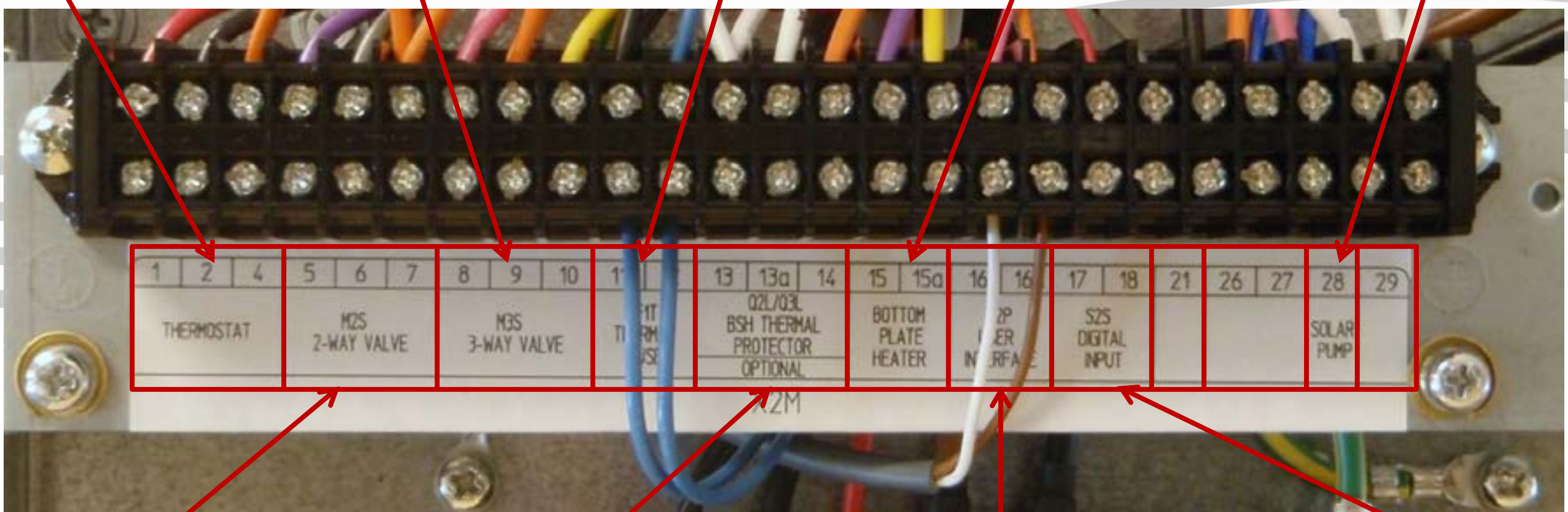
Thermostat
1, 4 Heating – 24VAC
2, 4 Cooling – 24VAC

3-way Valve 100mA max
8, 9 Heating – 24VAC
9, 10 DHW – 24VAC

Thermal Fuse
11, 12 –
208/240VAC

Bottom Plate Heater
15, 15a –
208/240VAC

21 – EKRP1HB
26, 27 – 24VAC & EKRP1HB
28 – EKRP1HB
29 – Not used



2-way Valve (Cooling) 100mA Max
5, 7 Normally Closed – 24VAC
6, 7 Normally Open – 24VAC

DHW Tank Q3L Safety
13, 14 – 208/240VAC

13a – Solar Pump
208/240VAC

User Interface
16, 16a – 15VDC
Do not connect any other control to these connections. MonoBloc does not come with wire harness for User Interface.

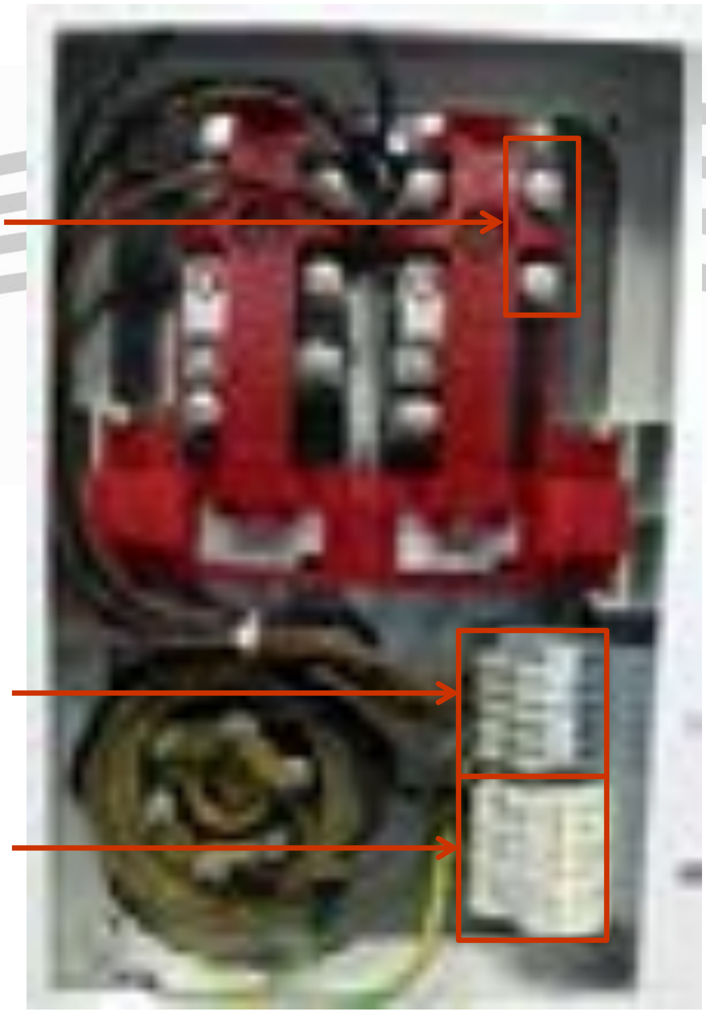
Digital Input – Time of Use Utility Rate (Benefit kWh)
17, 18 – voltage free contacts
See pages 206 ~ 211 for more information

DHW Tank Control Box

EKHWS050-080BAVJU

DHW Tank Control Box

Thermistor Well



Q3L Safety

X8M Solar Connections

X6M Hydrobox/MonoBloc Control Box Connections

Startup & Commissioning Guide

This guide is intended to aid the technician when it is time to start and test the Daikin Altherma's operation. This guide will only help the startup tech with Daikin Altherma products, non-Daikin equipment are not covered. Non-Daikin equipment install & operation manuals should be consulted prior to turning them ON.

This guide follows the startup steps laid out in the Startup and Configuration section of the Installation Manual for the Split and MonoBloc systems. If more detailed information is needed during startup, consult the installation, operation and manuals that came with the equipment. The manuals are also available at www.daikinac.com.

It is recommended that this guide be used in conjunction with the Daikin Altherma Commissioning Report.

Startup & Commissioning Overview

After the installation is complete a series of steps must be completed to properly startup and commission the Daikin Altherma system.

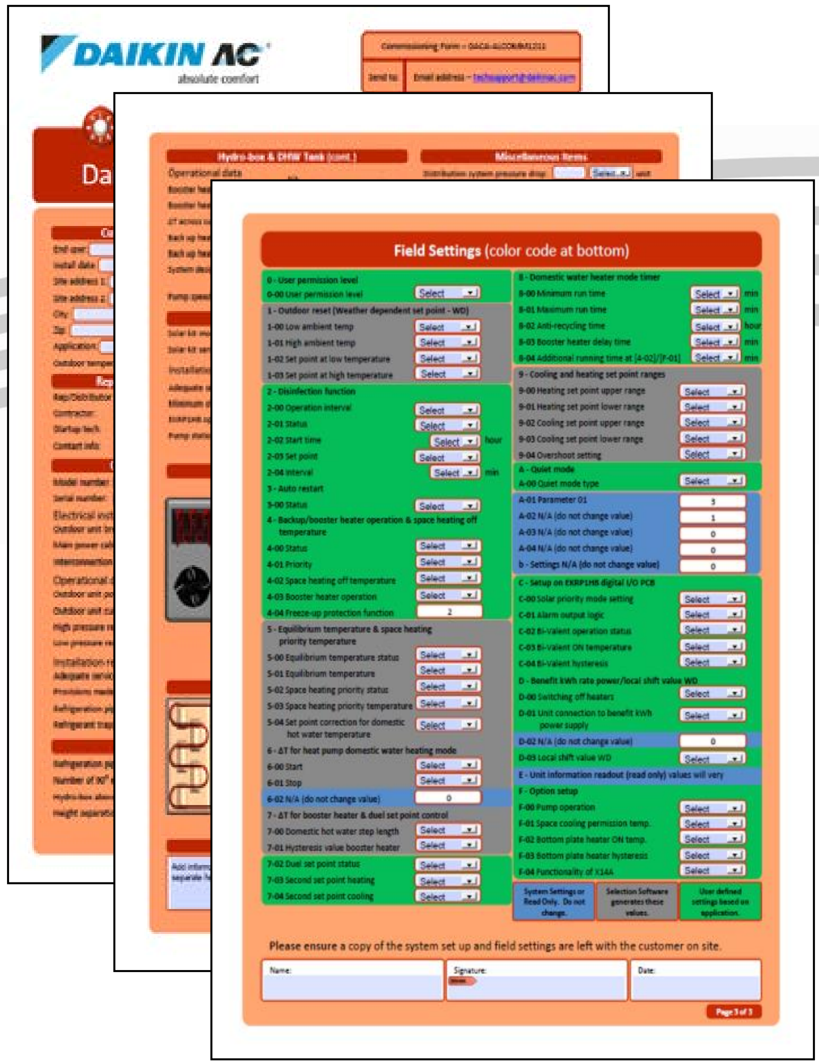
Overview

1. Use Commissioning Report as a check list until successful completion of startup and commissioning
2. Set DIP switch's on A1P PCB (Split System – Hydrobox) & A11P PCB (MonoBloc – Control box) (pages 27~33)
3. Pre-operation checks (pages 34~36)
4. Fill System with Water (page 37)
5. Pump speed selection (page 38)
6. Power up system (pages 39~40)
7. Set up User Interface & program Field Setting (pages 41~51)
8. Start and test system, set temperature set points for Heating, Cooling & DHW (pages 52~55)
9. Send Commissioning Report to Rep/Distributor & Daikin AC (see form for details)

Commissioning Report

Use the Commissioning Report to capture all startup information. Contractors can request copies from their local Rep or Distributors. Copies are also posted on Daikin AC's TRL or requests can be emailed to: techsupport@daikinac.com

Send in to your local Daikin Service Champion & Daikin AC when completed.

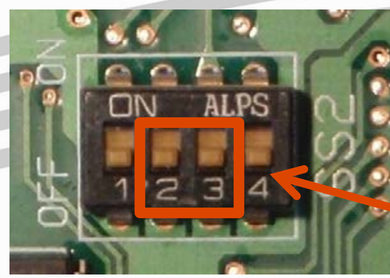


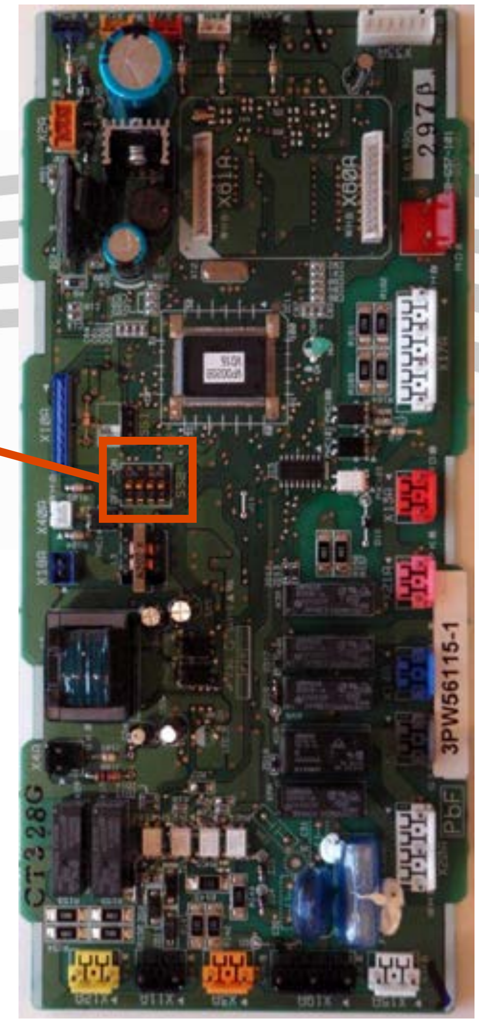
DIP Switch Configuration

In each installation DIP switches on main PCB in Hydrobox (A1P) or in MonoBloc (A11P) control box must be set

- Main PCB's are located in Control box of Hydrobox and MonoBloc
- Set DIP switch's before turning ON power
- DIP switch block SS2 is located on the control box PCB and allows configuration of domestic hot water tank installation, room thermostat connection and pump operation.
- ONLY DIP switch 2 & 3 have functions in North America

Dip switch SS2





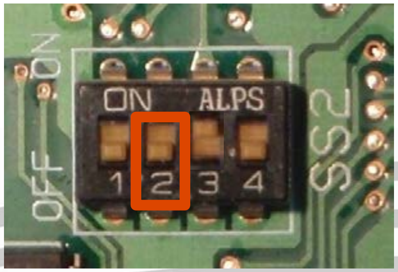
DIP switch SS2	Description	ON	OFF
1	Not applicable for installer	—	(Default)
2	Domestic hot water tank installation	Installed	Not installed (Default)
3	Room thermostat connection	Room thermostat connected	No room thermostat connected (Default)
4	This setting[a] decides the operation mode of the heat pump when there is a simultaneous demand for more space heating/cooling and domestic water heating.	Heating/cooling priority	Priority to highest demand side[b]

WARNING
Switch off the power supply before opening the control box service panel and making any changes to the DIP switch settings.

TYPO

DIP Switch Configuration (cont.)

Domestic hot water tank installations &
DHW 3rd Party Kit DIP switch setting



When **NO DHW tank** is installed, leave DIP switch SS2-2 in the OFF position (default)

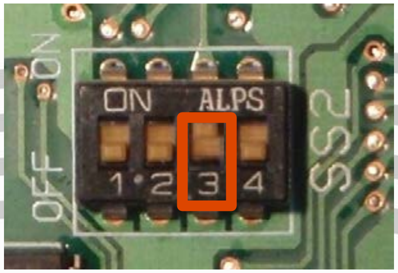
When a **DHW tank** is controlled by Daikin Altherma (i. e. EKHWS or Tank connected via 3rd party kit) DIP switch SS2-2 should be set to **ON**.

When the **optional DHW Kit** is used with a third party tank, DIP switch SS2-2 should be set to **ON**.

If **SS2-2** was set to **ON** without all necessary and correct wiring connections between hydrobox and control box of the domestic hot water tank, the error code **"AC"** will be displayed on the user interface.

DIP Switch Configuration (cont.)

Room thermostat installation / External control
DIP switch setting



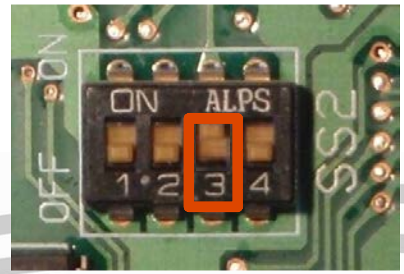
- **If control connected (wired) to X2M-1, 2, or 4 – DIP switch, SS2-3 must be turned ON position**
- **If no control and only the Daikin Altherma User interface is to be used for to control Heating and Cooling, leave DIP switch SS2-3 in the OFF position (default)**

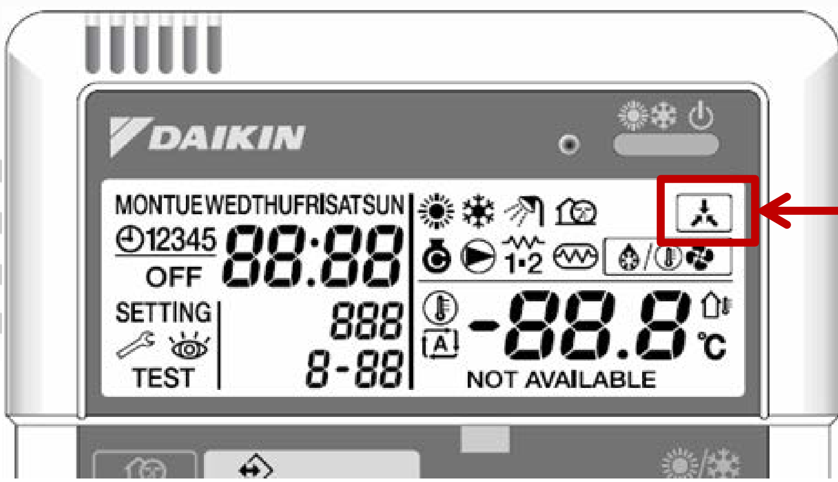
When **NO control** is connected to the hydrobox, DIP switch SS2-3 should be set to **OFF**.

When **controls** are connected to the hydrobox, DIP switch SS2-3 should be set to **ON**.

DIP Switch Configuration (cont.)

Room thermostat installation / External control DIP switch setting (cont.)





- When DIP Switch 3 is ON, the External Control icon should be present in the User Interface display.
- If it is not present in the display, reset switch and recycle power to condenser.

When the room thermostat is connected to the hydrobox, the heating and cooling schedule timers are never available. Other schedule timers are not affected. For more information on the schedule timers, refer to the Operation Manual.

When the room thermostat is connected to the hydrobox, and the button or ON/OFF button is pressed, the centralized control indicator will flash to indicate that the room thermostat has priority and controls on/off operation and change over operation.

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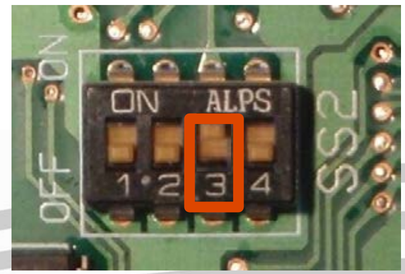
DIP Switch Configuration (cont.)

Pump operation DIP switch setting
(i. e. used for large storage tank applications)



Without controls
DIP switch SS2-3 = OFF

- When no controls are connected to the hydrobox, pump operation will be determined by the leaving water temperature. Non-continuous operation.
- To force continuous pump operation when no controls are connected do the following:
  - set DIP switch SS2-3 to ON
  - short-circuit the terminals X2M-1, 2 and 4 on the terminal block in the control box.

With controls
DIP switch SS2-3 = ON

- When controls are connected to the hydrobox, the pump will operate continuously whenever there is heating or cooling demand requested by the thermostat.

Thermostat	Configuration	Pump operation			
No thermostat	• SS2-3 = OFF • wiring: (non) X2M 1 2 3 4	determined by leaving water temperature[a]	UI	UI	UI
	• SS2-3 = ON • wiring: X2M 1 2 3 4	on when space heating or cooling is on	UI	UI	UI
Heating only thermostat	• SS2-3 = ON • wiring: (see installation manual of the room thermostat kit)	on when heating request by room thermostat	T	—	—
Thermostat with heating/cooling switch	• SS2-3 = ON • wiring: (see installation manual of the room thermostat kit)	on when heating request or cooling request by room thermostat	T	T	—

DIP Switch Configuration (cont.)

Room thermostat installation - External control & User interface – Control hierarchy

- The following table summarizes the required configuration and thermostat wiring at the terminal block (X2M: 1, 2 or 4) in the control box.
- Pump operation is listed in the third column. The three last columns indicate whether the following functionality is available on the user interface (UI) or handled by the thermostat (T):
  - space heating or cooling on/off ( )
  - heating/cooling changeover ( )
  - heating and cooling schedule timer ( )

(a) The pump will stop when space heating/cooling is turned off or when the water reaches the desired water temperature as set on the user interface. With space heating/cooling turned on, the pump will then run every 5 minutes during 3 minutes to check the water temperature.

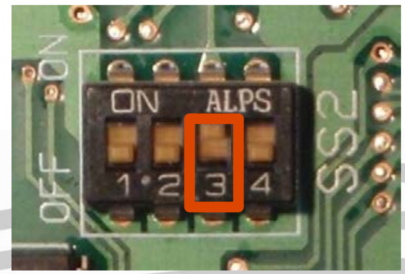
User interface

Thermostat

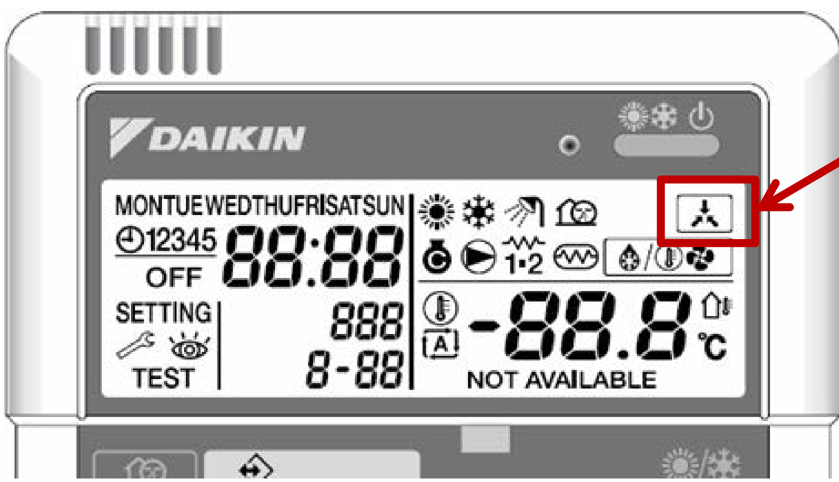
Thermostat	Configuration	Pump operation			
No thermostat	• SS2-3 = OFF • wiring: (non) X2M 1 2 3 4	determined by leaving water temperature[a]	UI	UI	UI
	• SS2-3 = ON • wiring: X2M 1 2 3 4	on when space heating or cooling is on ( )	UI	UI	UI
Heating only thermostat	• SS2-3 = ON • wiring: (see installation manual of the room thermostat kit)	on when heating request by room thermostat	T	—	—
Thermostat with heating/cooling switch	• SS2-3 = ON • wiring: (see installation manual of the room thermostat kit)	on when heating request or cooling request by room thermostat	T	T	—

DIP Switch Configuration (cont.)

DHW Only Installations



- When Daikin Altherma is installed in a domestic hot water heating only application, it is recommended to turn DIP switch 3 to the ON position.
- This will prevent the User Interface from being turned On accidentally by the end user.



- When DIP Switch 3 is ON, the External Control icon should be present in the User Interface display.
- If it is not present in the display, reset switch and recycle power to condenser.

Pre-operation Checks (cont.)

Check each one and mark off on Commissioning Report when needed

1. **Field wiring**

   Make sure that the field wiring between local supply panel and hydrobox, outdoor unit and hydrobox, hydrobox and valves(when applicable), hydrobox and room thermostat (when applicable), and hydrobox and domestic hot water tank has been carried out according to the instructions described in the chapter "Field wiring", according to the wiring diagrams and according to local laws and regulations.

2. **Fuses, circuit breakers, or protection devices**

   Check that the fuses, circuit breakers, or the locally installed protection devices are of the size and type specified in the chapter "Technical specifications". Make sure that neither a fuse nor a protection device has been bypassed.

3. **Backup heater circuit breaker F1B/F3B**

   Do not forget to turn on the backup heater circuit breaker F2B in the switchbox (F1B/F3B depends on the backup heater type). Refer to the wiring diagram.

4. **Booster heater circuit breaker F2B**

   Do not forget to turn on the booster heater circuit breaker F2B in the switch box (applies only to units with optional domestic hot water tank installed).

Pre-operation Checks (cont.)

5. **Ground wiring**
   Make sure that the ground wires have been connected properly and that the ground terminals are tightened.
6. **Internal wiring**
   Visually check the switch box on loose connections or damaged electrical components.
7. **Fixation**
   Check that the unit is properly fixed, to avoid abnormal noises and vibrations when starting up the unit.
8. **Damaged equipment**
   Check the inside of the unit on damaged components or squeezed pipes.
9. **Refrigerant leak**
   Check the inside of the unit on refrigerant leakage. If there is a refrigerant leak, call your local dealer.
10. **Power supply voltage**
    Check the power supply voltage on the local supply panel. The voltage must correspond to the voltage on the identification label of the unit.
11. **Air vent**
    Make sure the air vent (hi-vent) valve is open, at least 2 turns.

Pre-operation Checks (cont.)

12. Pressure relief valve

Verify that the backup heater is completely filled with water by operating the pressure relief valve. It should purge water instead of air.

Operating the system with the backup heater not completely filled with water will damage the backup heater!

13. Shut-off valves

Make sure that the shut-off valves are correctly installed and fully open.

Operating the system with closed valves will damage the pump!

Water Quality & Filling the System

Filling the System with Water

- Water quality must be in accordance with the "Safe Drinking Water Act (42 U.S.C. 300F)". For more information go to; http://water.epa.gov/drink.
- All well water supplied systems need a pre-filter and water quality should be checked for possible treatment needs.
- It is recommended to use either an automatic fill valve or a manual fill valve so proper system water pressure is maintained.
- The fill valve should be set to a pressure that corresponds to the highest water point in the system.
- Minimum water pressure is 4.3 PSI and maximum is 43.5 PSI.

PSI	4.3	6.5	8.7	10.8	13.0	15.2	17.3
Feet Head	10	15	20	25	30	35	40

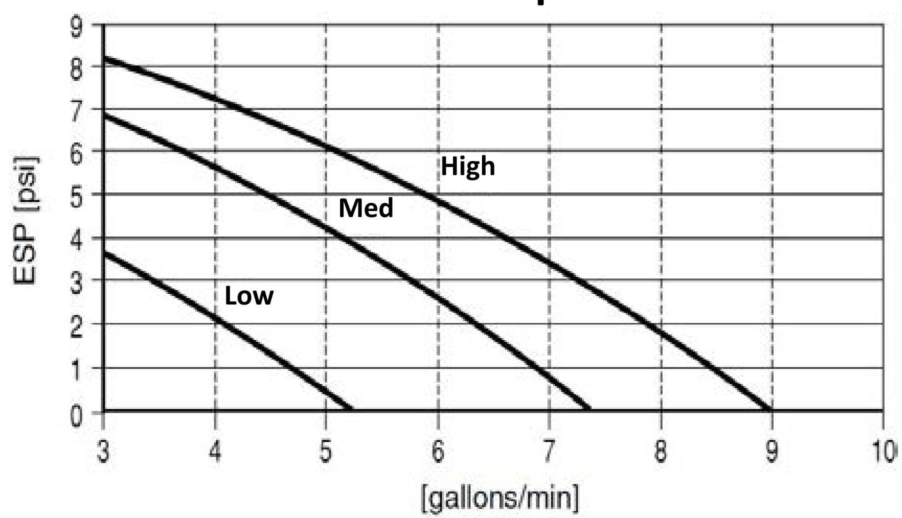
Note: To find PSI for any feet head, multiply feet head by 0.433

Pump Speed Selection

Set Pump Speed

- The pump speed needs to be set prior to startup.
- The default setting is set to high speed. The actual setting will depend on the design of the distribution system.
- Check pump charts in Installation Manual and set speed to match design GPM.
- **For MonoBloc Only** – Pump is only 2 speeds.
  Speeds Low & Med are same.

EKHBX030 Pump Chart



018~030
Pump

Internal Water Pump

036~054
Pump

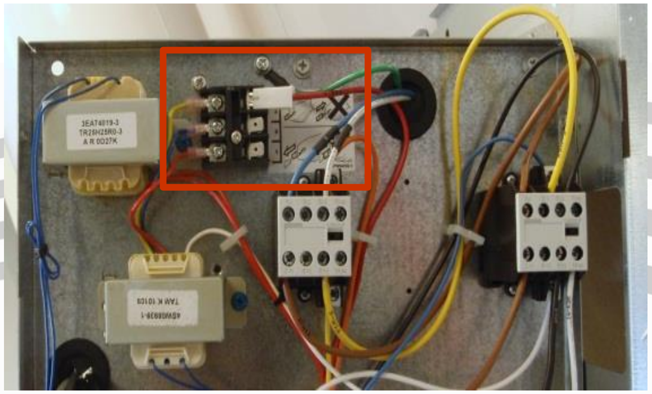
1 – Low
2 – Med
3 – High

Low
Med
High

Power Up System

Set Power Input Selection to Transformer TR2

Hydrobox Control Box

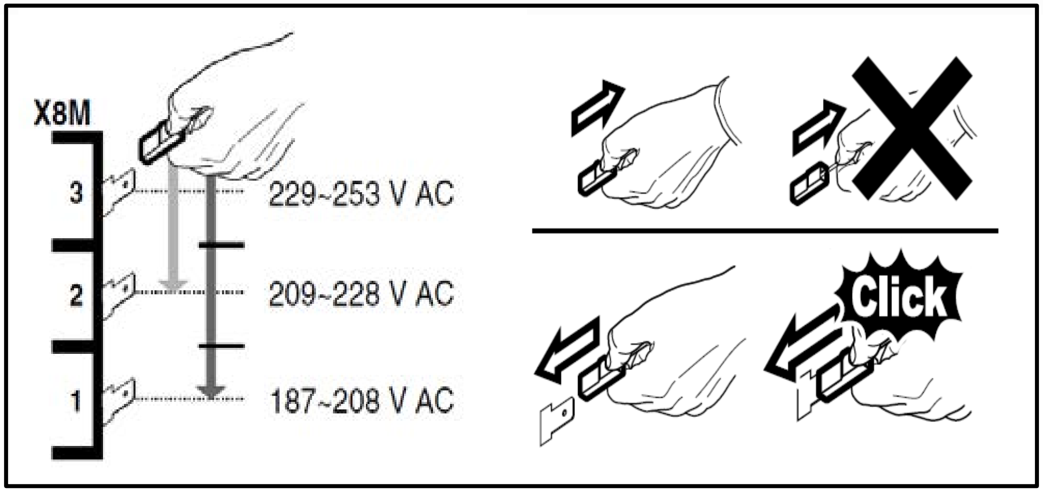


This selection is needed to ensure a stable 24 VAC control circuit.

DANGER
Switch off all relevant power supply (outdoor unit, backup heater, booster heater) before changing the connector.

If incoming power is 220-240VAC skip this step.

1. Measure main input power.
2. Reconnect wire according to the result of measurement.
3. Default is position 3 – 229 ~ 253 VAC



In the event the incoming power is unstable , add a surge protector or power monitor to protect the equipment.

Power Up System (cont.)

Powering Up the System

1. Verify power supply meets the equipment's requirement prior to turning ON the disconnects(s).

2. Turn ON power to all equipment. All zones should be OFF and not calling.

3. When the power supply applied to the Split or MonoBloc is turned ON, an "88" is displayed on the user interface during its initialization, which might take up to 60 seconds. During this process the user interface cannot be operated.

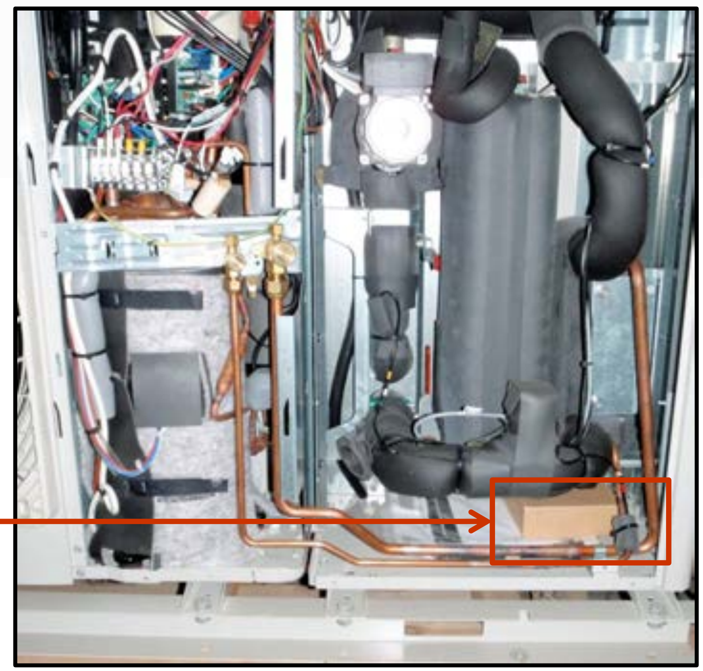
User Interface

User Interface Location - Hydrobox

User Interface on MonoBlocs are shipped in a box within the outdoor unit.

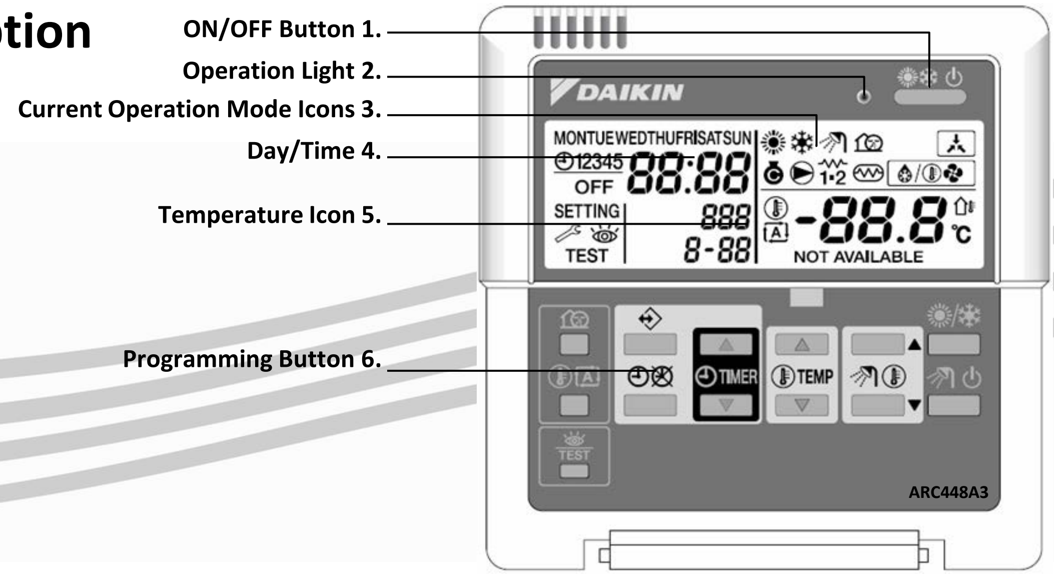
User Interface must be installed indoors in an accessible location for ease of operation and monitoring

User Interface

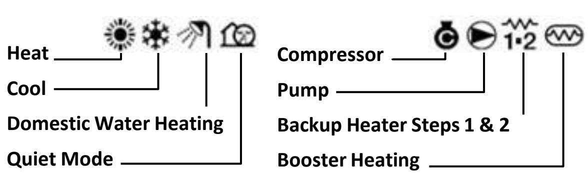


User Interface (cont.)

Icon & Button Description



1. ON/OFF Button: (not active when external control is used)
2. Operation Light: Lit when system is Heating or Cooling. Blinks in the event of system malfunction.
3. Current Operation Mode: These icons represent the current operation mode:

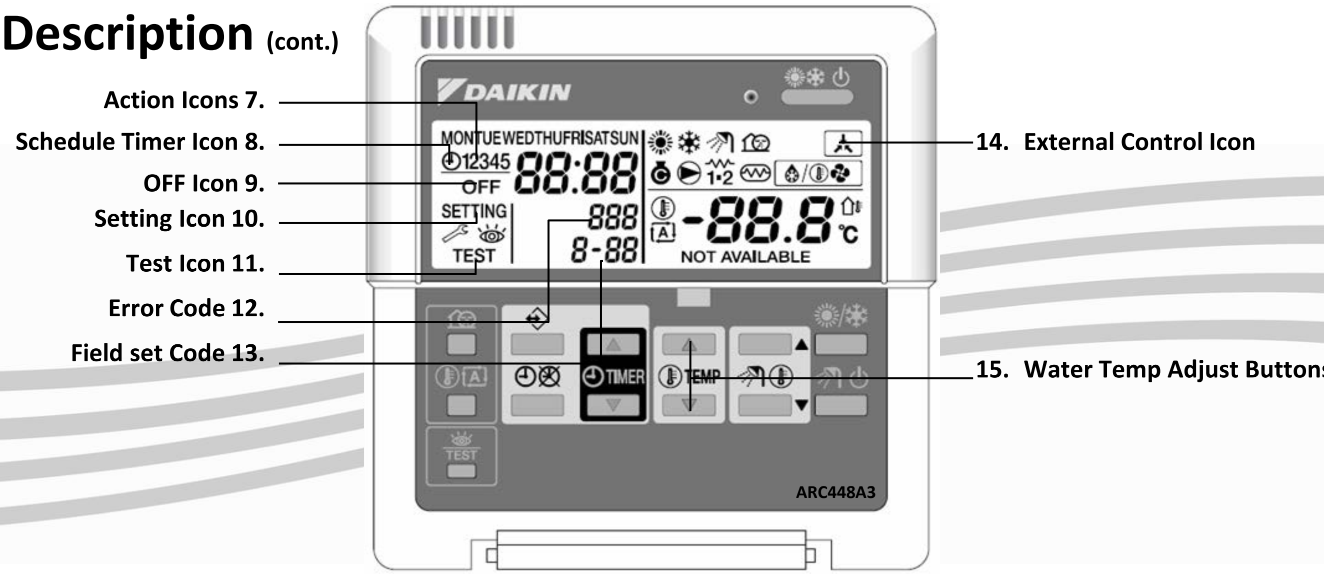


In some instances more than one mode icon can be displayed at the same time. If the solar option is installed and active the domestic water heater icon will be blinking.

4. Day/Time: The time display indicates the current time(or the action day time when reading or programming the schedule timer). The day of the week indicator shows the current weekday (or the set day when reading or programming the schedule timer). Clock is 24hr format.
5. Temperature Icon: This icon is displayed when the water outlet temperature of the hydrobox, the outdoor ambient and the domestic hot water tank temperature are shown. The icon is also displayed when the temperature set point is set in the schedule timer programming mode.
6. Programming Button: This multi-purpose button is used to program the controller. The function of the button depends on the actual status of the controller or on previous actions carried out by the operator.

User Interface (cont.)

Icon & Button Description (cont.)



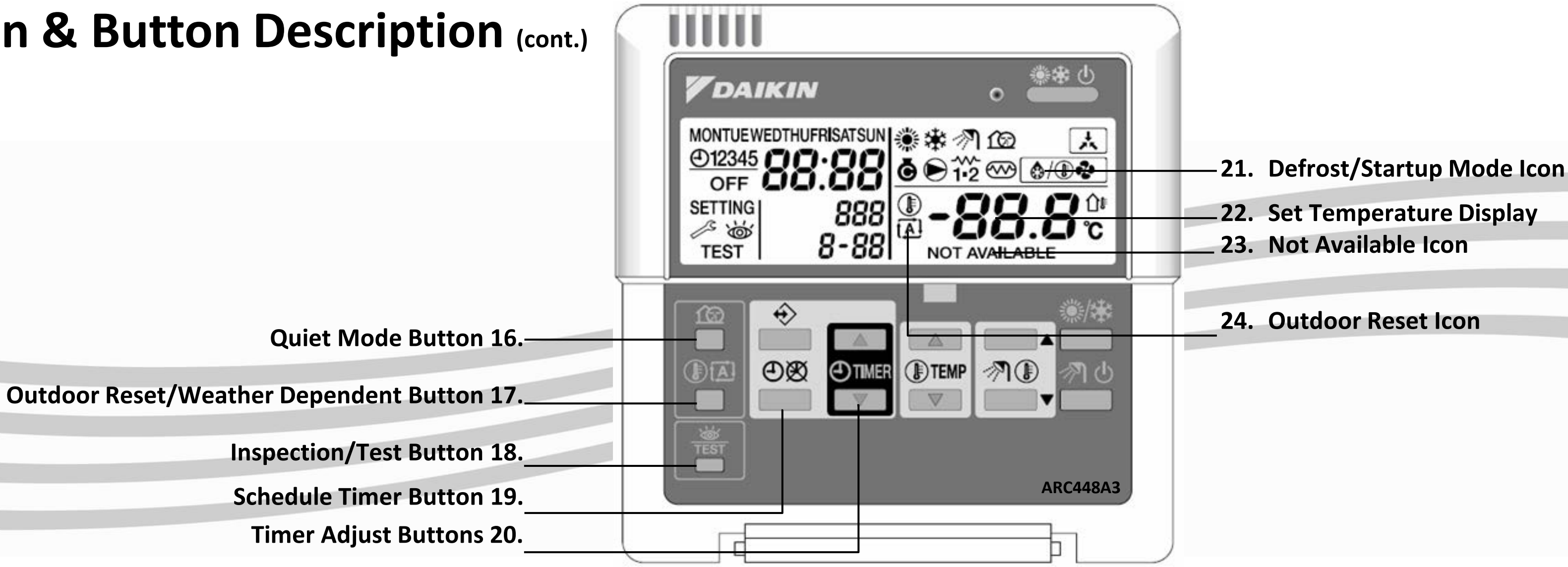
7. Action Icons: These icons indicate the programming actions for each day of the schedule timer.
8. Schedule Timer Icon: This icon indicates that the schedule timer is enabled.
9. OFF Icon: This icon indicates that the OFF action is selected when programming the schedule timer.
10. Setting Icon: Not used. For installation purposes only.
11. Test Icon: This icon indicates that the unit runs in test mode.
12. Error Code: This code refers to the error code list and is for service purposes only. Refer to the error code list in the installation manual.
13. Field Set Code: This code represents the code from the field set list. Refer to the "Field settings table" in Operation Manual.
14. External Control Icon: This icon indicates that the room thermostat (optional) is controlling occupied space temperature. This external room thermostat can start and stop the space heating/cooling operation and change the operation mode (heating/cooling).
15. Water Temperature Adjust Buttons: These multi-purpose buttons are mainly used to control leaving water set point for Heating/Cooling Operation. They are also used for several programming actions; schedule timer, outdoor reset and setting day of the week.

Heating/Cooling Water Set Point Range	
Heating	Cooling
59 - 131°F (15 – 55°C)	41 - 71°F (5 - 22°C)

User Interface (cont.)

User Interface (cont.)

Icon & Button Description (cont.)



16. Quiet Mode Button: This button enables or disables quiet mode.
17. Outdoor Reset/Weather dependent Button: This button enables or disables the outdoor reset set point function which is available in space heating operation only.
18. Inspection/Test Button: This button is used for installation purposes and changing field settings.
19. Schedule Timer Button: The main function of this multi-purpose button is to enable/disable the schedule timer.
20. Timer Adjust Buttons: These multi-purpose buttons are used to adjust the clock, to toggle between temperatures (water outlet temperature of hydrobox section, outdoor ambient temperature and domestic hot water temperature) and in schedule timer programming mode.

21. Defrost/Startup Mode Icon: This icon indicates that the defrost/startup mode is active.
22. Set Temperature Display: The display shows the current space heating/cooling set temperature of the installation in °C or °F.
23. Not Available: This icon is displayed whenever a non-installed option is addressed or a function is not available.
24. Outdoor Reset/Weather Dependent Icon: This icon indicates that the controller will adapt the temperature set point automatically, based on the outdoor ambient temperature.

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User Interface (cont.)

Icon & Button Description (cont.)

Space Heating/Cooling Button 25.

Domestic Water Heater Button 26.

Domestic Water Heater Temperature Adjust Buttons 27.

Temperature Conversion Chart

°C	°F	°C	°F	°C	°F	°C	°F
-20	**-4**	15	**59**	32	**90**	47	**117**
-15	**5**	16	**61**	33	**91**	48	**118**
-10	**14**	17	**63**	34	**93**	49	**120**
-5	**23**	18	**64**	35	**95**	50	**122**
0	**32**	19	**66**	36	**97**	51	**124**
5	**41**	20	**68**	37	**99**	52	**126**
6	**43**	21	**70**	38	**100**	53	**127**
7	**45**	22	**72**	39	**102**	54	**129**
8	**46**	25	**77**	40	**104**	55	**131**
9	**48**	26	**79**	41	**106**	60	**140**
10	**50**	27	**81**	42	**108**	65	**149**
11	**52**	28	**82**	43	**109**	70	**158**
12	**54**	29	**84**	44	**111**	75	**167**
13	**55**	30	**86**	45	**113**	80	**176**
14	**57**	31	**88**	46	**115**		

25. Space Heating/Cooling Button: This button allows manual switching between heating or cooling mode (provided the unit is not a heating only unit).When the unit is connected with an external room thermostat, this button is not operable and the icon External Control icon is shown.
26. Domestic Water Heater Button: This button enables or disables heating of the domestic water.
27. Domestic Water Heater Temperature Adjust Buttons: These buttons are used to adjust the current set point of the domestic hot water temperature.

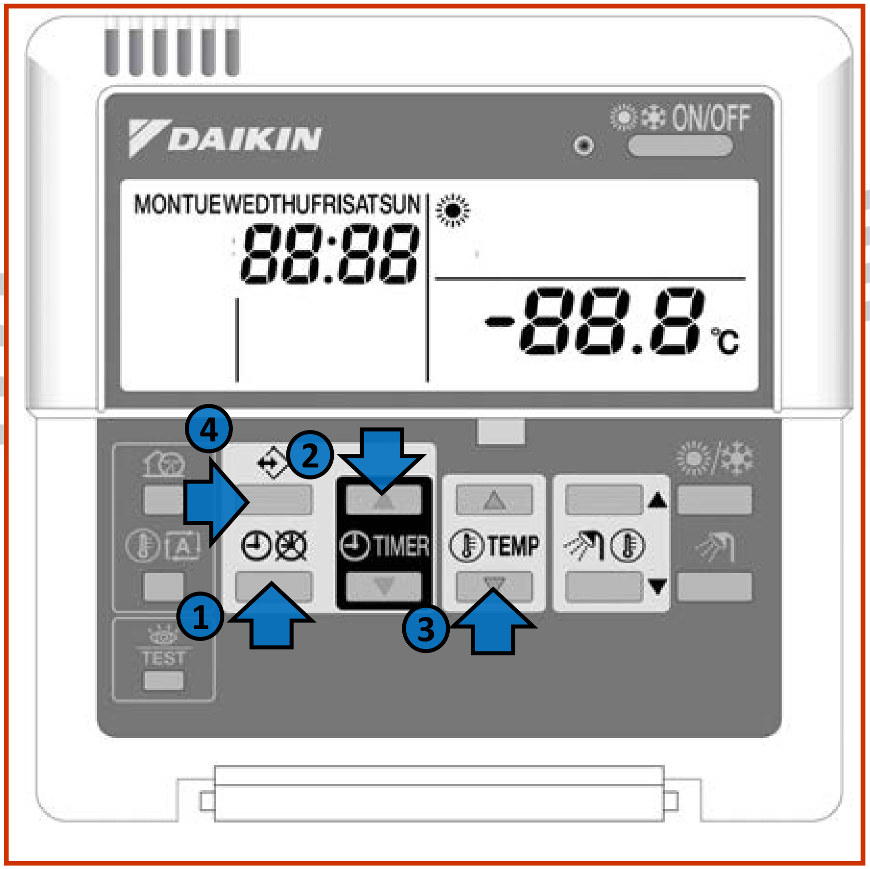
Domestic Water Heater Set Point Range
77 - 176°F (25 – 80°C)

Additional Information and Settings

- Fahrenheit or Celsius can be selected on model ARC448A3 (ARC448A2 can only display Celsius)
  - To change from °C to °F press and hold the Temp Up & Down buttons for 5 seconds
  - To change back °F to °C press and hold the Temp Up & Down buttons for 5 seconds
- On board battery will maintain all settings for 2 hours, after 2 hours clock and day of week may need to be reset. All other programming will <u>not</u> be lost.

Setting the Clock

Set Clock and Day of Week



1. **Hold down the button for 5 seconds**
   (The clock read-out and the day of week indicator start flashing)

2. **Use the or buttons to adjust the clock.**

3. **Use the or buttons to adjust the day of the week.**

4. **Press the button once to confirm the current set time and day of the week.**

To leave this procedure without saving, press the button.

Programming Field Settings

Understanding Field Settings

The hydrobox needs to be configured by the installer to match the installation environment (outdoor climate, installed options, etc.) and user demand. Configuring the installation is accomplished by using “field settings”. These field settings are accessible and programmable through the user interface on the hydrobox.

Each field setting is assigned a 3-digit number or code, for example [1-03], which is indicated on the user interface display. The first digit [1] indicates the 'first code' of the field setting group. The second and third digit [03] together indicates the 'second code'.

A list of all field settings and default values are listed in Daikin Altherma’s Installation and Engineering Manual under "Field settings table". Detailed explanations are also listed on pages 156 ~ 214 of this publication.

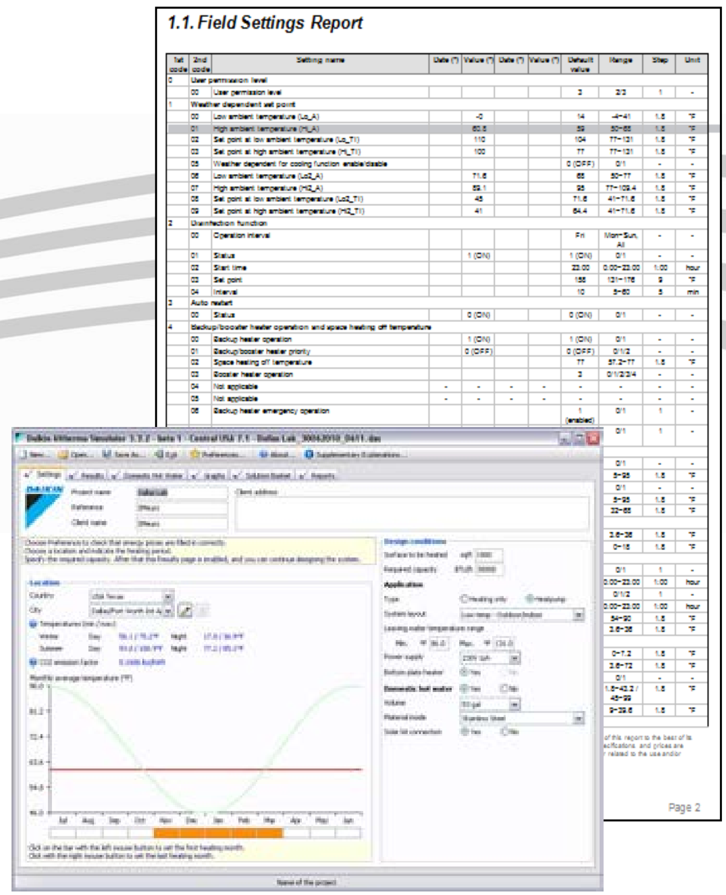
Programming Field Settings (cont.)

Selection Software Generated Field Settings

The selection software should be used on every application of the Altherma product. When used properly the report is generates will produce about 1/3 of the field settings needed for when it is time to commission the Daikin Altherma, we recommend that all these be entered prior to startup.

Use the Field Settings Report to enter these values. There are approximately 12 to 15 values needing to be set on each installation.

Some Field Settings that the report does not provide will still need to be set. These will be based on application. If after reading Installation manual you are still not sure what to set contact, contact your local Daikin Service Champion for assistance.



Programming Field Settings (cont.)

Program the Field Settings

Enter all the numbers listed in the “value” column of the Field Settings Report

If when entering the field settings, if the value was left blank, check Installation Manual and decide if this applies to your application.

If valve is the same as the on already programmed, move on to the next.

1st & 2nd code

Example: User Permission level’s field setting code is [0-00]

1st code	2nd code	Setting name	Date (*)	Value (*)	Date (*)	Value (*)	Default value	Range	Step	Unit
0	**User permission level**									
	00	User permission level					3	2/3	1	-
1	**Weather dependent set point**									
	00	Low ambient temperature (Lo_A)		-0			14	-4~41	1.8	°F
	01	High ambient temperature (Hi_A)		60.8			59	50~68	1.8	°F
	02	Set point at low ambient temperature (Lo_TI)		110			104	77~131	1.8	°F
	03	Set point at high ambient temperature (Hi_TI)		100			77	77~131	1.8	°F

Recommended Field Settings to Enter

In the event that the Field Setting Report is unavailable we have come up with a general setting list. This list will work in most cases, but some of the numbers are very conservative. When commissioning without a FS report only program the settings in the table on the right. If when programming the setting is unavailable move on to the next.

This list is for a basic application and does not include setup for, Bi-valent, EKRP1HB I/O board setup, Dual set point or Set point range limitation. For these types of applications, consult the Installation Manual and the Field Settings section in this book or your local Daikin Service Champion.

We do recommend that the Field Setting report is obtained and utilized so the Daikin Altherma can be configured to its optimum capabilities for every application to reach it's expected energy savings.

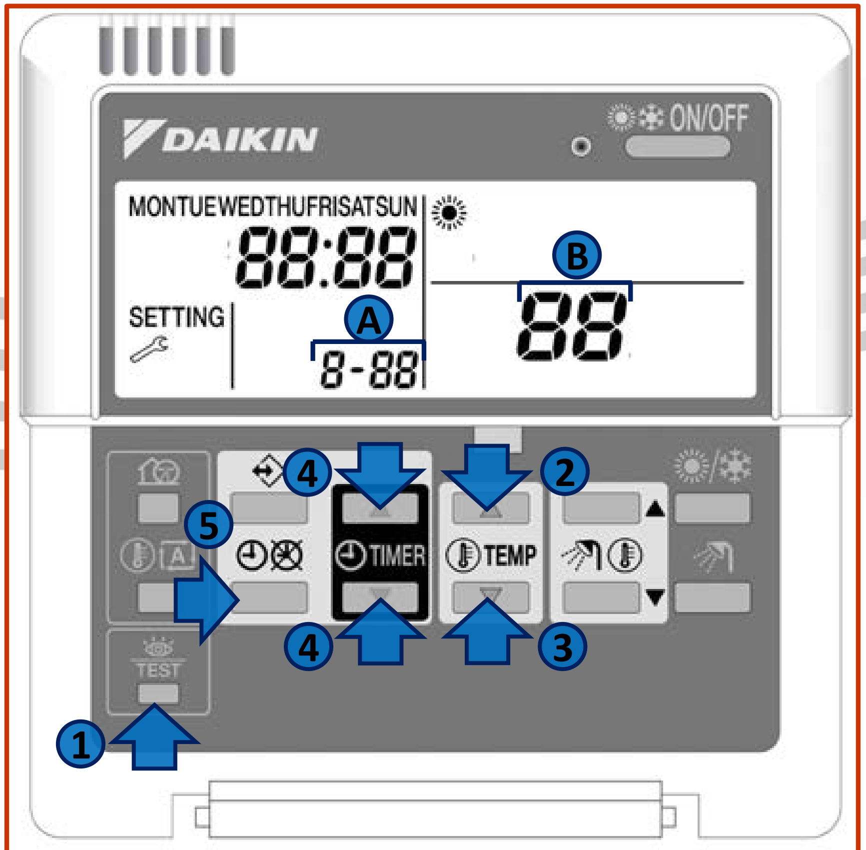
If Outdoor Reset is not going to be used FS [1-00] ~ [1-03] need not be set.

Field Setting	New Value
Heating Field Settings	
1-00	Outdoor Winter Design Temp
1-01	62.6F / 17C
1-02	Heating Loop Set Point Temp
1-03	91.4F / 33C
5-00	0 (OFF)
Cooling Field Settings	
F-01	50F / 10C
DHW Tank Field Settings	
8-02	0.5 hour
8-03	20 min.

If Outdoor Reset is not going to be used FS [1-00] ~ [1-03] need not be set.

How to Enter Field Setting Mode

Field Setting Programming Instructions.



1. Press the button for a minimum of 5 seconds to enter FIELD SET MODE, the display will change to show:-

   The SETTING icon and the first field setting code will be displayed “0-00” (A), with the set value displayed to the right (B).
2. Press the button to select the appropriate field setting first code.
3. Press the button to select the appropriate field setting second code.
4. Press the button and button to change the set value of the select field setting.
5. Save the new value by pressing the button.
6. When finished, press the button to exit Field Setting Mode.

Startup

Recap:

1. DIP switches were set
2. Entire system has power applied
3. Altherma and distribution system has been filled with water and purged free of air
4. Altherma user interface has been programmed, clock & field settings

Now zone controls can be turned ON, make sure to test each mode of operation

Depending on the outdoor temperature, not all modes may not be available at the time of startup and commissioning.

- Heating operation not available above 77°F/25°C sm. split & 95°F/35°C lg. split.
- Cooling operation not available below 50°F/10°C (Field Setting [F-01] default 68°F/20°C)
- DHW (Heat Pump operation) not available above 95°F/35°C
- DHW (Heat Pump operation) not available below Field Setting [5-03], if Field Setting [5-02] is set to 1 (ON)

When power is applied or reapplied to the Altherma condenser, the system will go through a short self test in cooling mode (approx. 3min.) before going into the mode being called for. The next time the system turns ON, the system will go to that mode immediately.

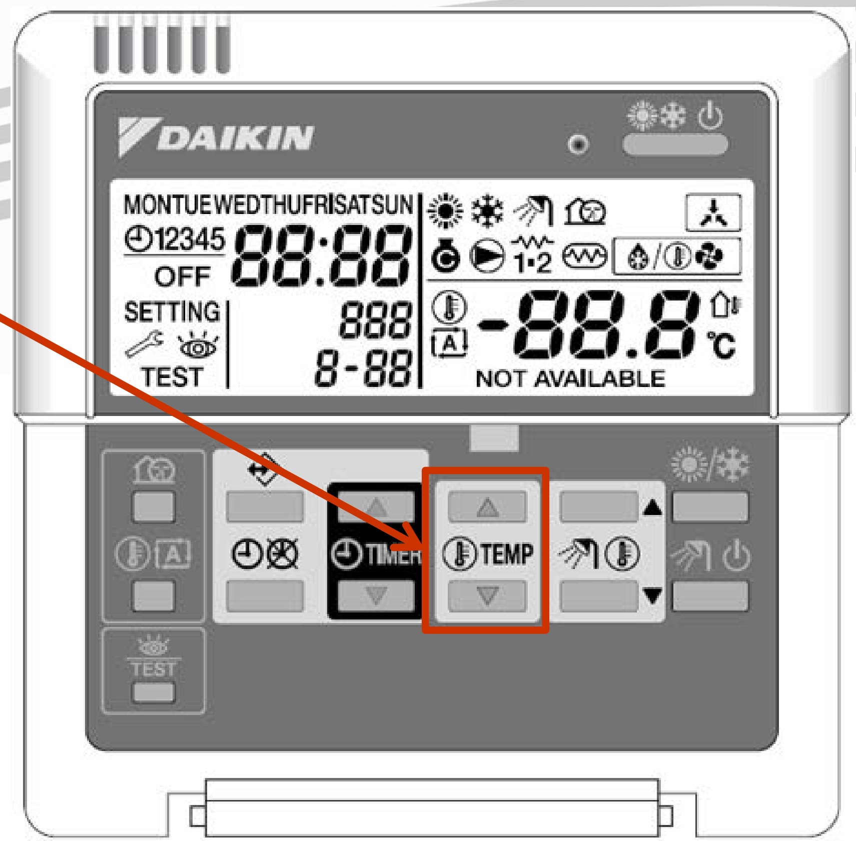
Startup (cont.)

Loop set point temperatures must be set in each mode of operation.

The Cooling and Heating set points are set by placing a call for either mode and then using the User Interface to set the temperature.

Mode will be selected either at the User Interface if DIP switch SS2-3 is OFF or at the Zone control thermostat if DIP switch SS2-3 is ON.

NOTE: Field Settings [9-00] ~ [9-03] do not set loop set points



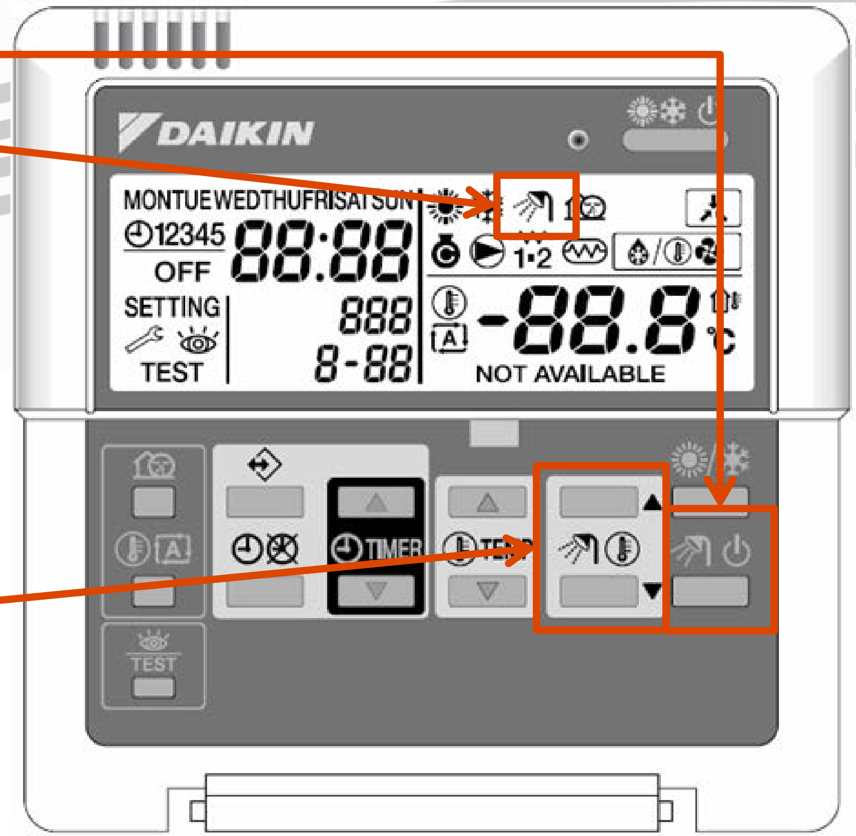
Startup (cont.)

DHW Tank set point temperature must be set.

If a Domestic water tank is installed turn it on by pressing the ON button. If the "Shower Icon" is not shown in the display the DHW mode is OFF.

Set point is adjusted by using the DHW tank TEMP up & down arrows.

When these buttons are pressed the display will change from loop heating set point to DHW tank set point. After a few seconds the display will revert to the loop temperature display.

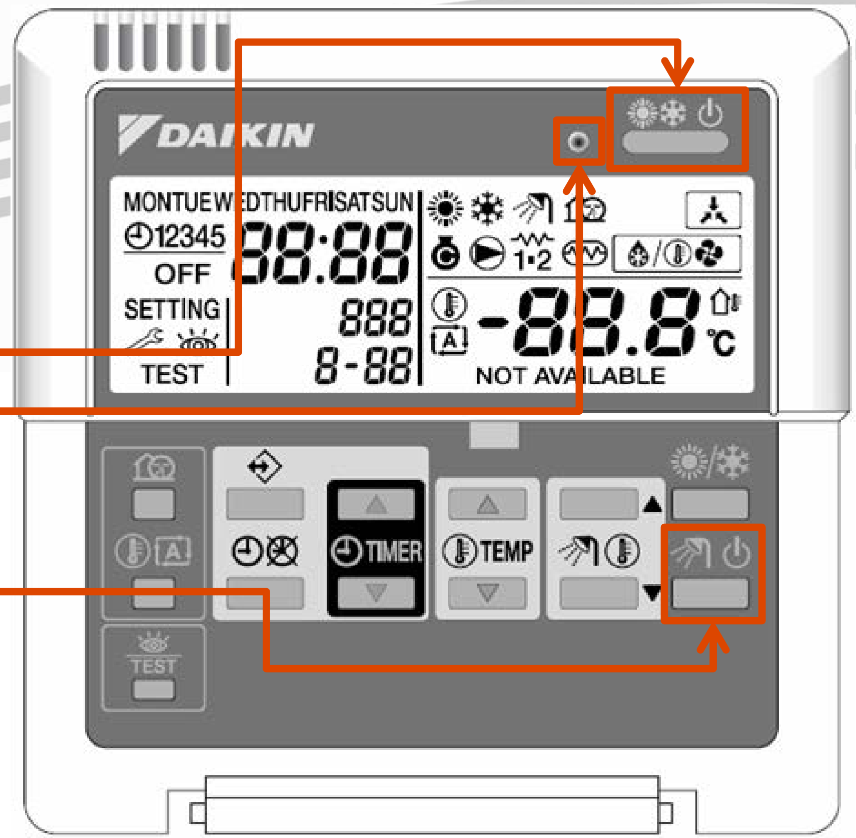


Startup (cont.)

Important Note Regarding Daikin Altherma DHW Only Installations, No Heating or Cooling

In applications that are only using DHW mode and no heating or cooling functions of the Daikin Altherma are being utilized, the Heat/Cool ON/OFF button is not used. The red indicator light should never be ON.

Only the DHW ON/OFF button should be used to turn ON/OFF DHW mode.

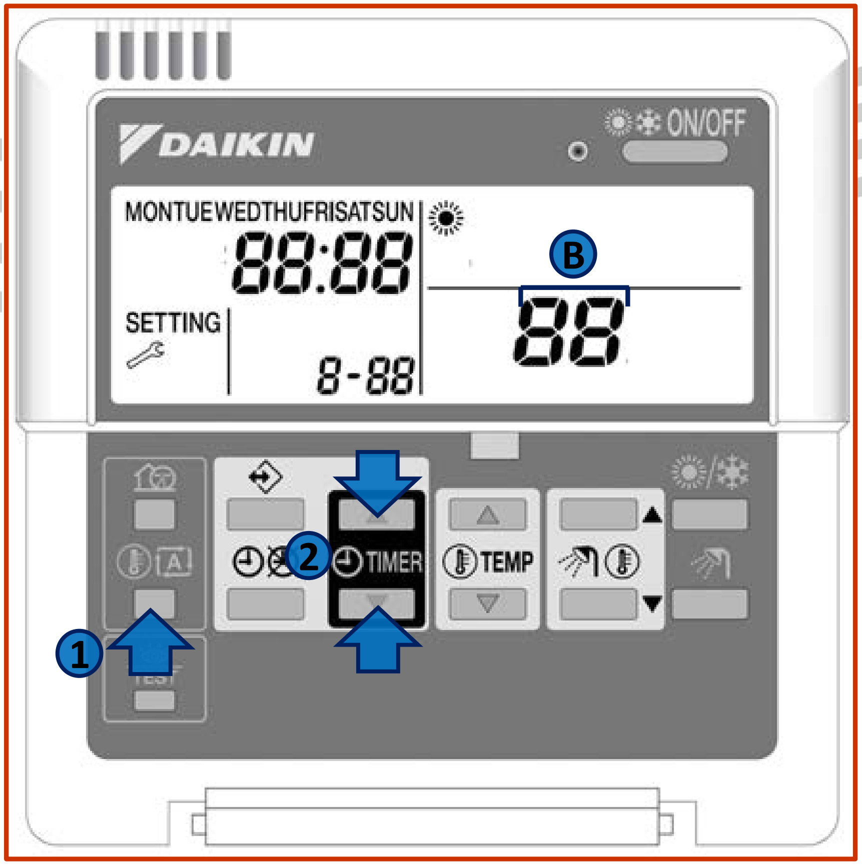


See page 33 for DIP switch setting

Temperature Reading Function

Three temperatures can easily be read from the User Interface

Heating/Cooling leaving water temp, Outdoor ambient and DHW tank.



1. Press the button for a minimum of 5 seconds.
2. Use the and buttons to display: B
   - The outdoor temperature (icon is flashing).
   - The domestic hot water tank temperature (icon is flashing).
   - The outgoing water temperature (icon is flashing).

If no button is pressed for 5 seconds, the temp reading display exits and the display changes back to normal.

Common Installation Errors

System is filled with water but system pressure gauge does not respond

POSSIBLE CAUSES	CORRECTIVE ACTION
Plastic shipping plugs are still in place	Remove piping and check for shipping plugs

Hydrobox Connections

MonoBloc Connections

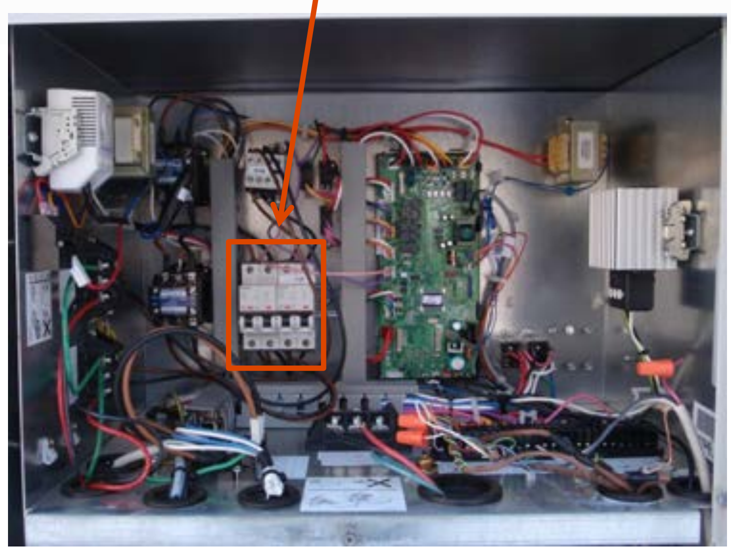
Water Pressure Gauge

Common Installation Errors (cont.)

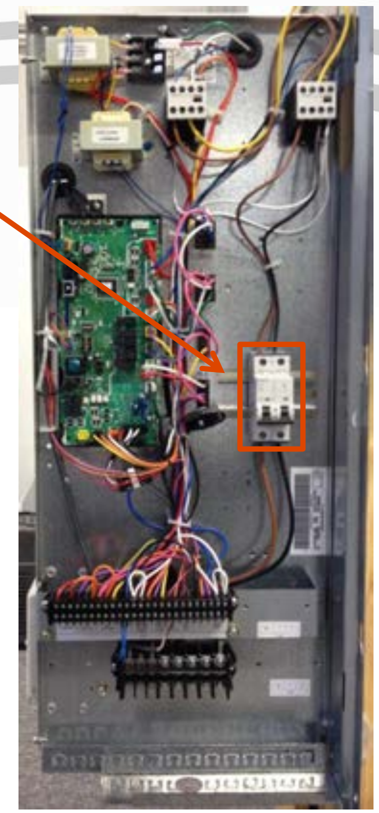
Backup Heater and or Booster Heater icon is displayed , but heaters are not operating.

1. Check internal breakers to make sure they are ON
   - Green is OFF (handle down)
   - Red is ON (handle up)

MonoBloc



Split



Common Installation Errors (cont.)

Symptom 1: The unit is turned on ( LED is lit) but the unit is not heating or cooling as expected

POSSIBLE CAUSES	CORRECTIVE ACTION
The temperature setting is not correct.	Check the controller set point.
System is out of operation range	Check outdoor temp and compare to systems operation range.
The water flow is too low. (no error in display)	• Check that all shut off valves of the water circuit are completely open. • Check if the water filter needs cleaning. • Make sure there is no air in the system (purge air) • Check on the manometer that there is sufficient water pressure. The water pressure must be >14.5 psi (>1 bar) (water is cold) • Check that the pump speed setting is on the highest speed • Make sure that the expansion vessel is not broken. • Check that the resistance in the water circuit is not too high for the pump (refer to "Setting the pump speed" in manual.
The water volume in the installation is too low.	• Make sure that the water volume in the installation is above the minimum required value (refer to "Checking the water volume and expansion vessel pre-pressure" in manual.

Common Installation Errors (cont.)

Symptom 2: The unit is turned on but the compressor is not starting (space heating or domestic water heating)

POSSIBLE CAUSES	CORRECTIVE ACTION
The unit must start up out of its operation range (the water temperature is too low).	In case of low water temperature, the system utilizes the backup heater to reach the minimum water temperature first (59°F)(15°C). • Check that the backup heater power supply is correct. • Check that the backup heater thermal fuse is closed. • Check that the backup heater thermal protector is not activated. • Check that the backup heater contactors are not broken.

Symptom 3: Pump is making noise (cavitation)

POSSIBLE CAUSES	CORRECTIVE ACTION
There is air in the system.	Purge air.
Water pressure at pump inlet is too low.	• Check on the manometer that there is sufficient water pressure. The water pressure must be >14.5 psi (>1 bar) (water is cold). • Check that the manometer is not broken. • Check that the expansion vessel is not broken. • Check that the setting of the pre-pressure of the expansion vessel is correct (refer to "Setting the pre-pressure of the expansion vessel" in manual.

Common Installation Errors (cont.)

Symptom 4: The water pressure relief valve opens

POSSIBLE CAUSES	CORRECTIVE ACTION
The water volume in the installation is too high.	Make sure that the water volume in the installation is under the maximum allowed value (refer to "Checking the water volume and expansion vessel pre-pressure" in manual.
The expansion vessel is broken.	Replace the expansion vessel.

Symptom 5: The water pressure relief valve leaks

POSSIBLE CAUSES	CORRECTIVE ACTION
Dirt is blocking the water pressure relief valve outlet.	Check for correct operation of the pressure relief valve by turning the red knob on the valve counter clockwise: • If you do not hear a clacking sound, contact your local dealer. • In case the water keeps running out of the unit, close both the water inlet and outlet shut-off valves first and then contact your local dealer.

Symptom 6: The user interface displays "NOT AVAILABLE" when pressing certain buttons

POSSIBLE CAUSES	CORRECTIVE ACTION
The current permission level is set to a level that prevents using the pressed button.	Change the "user permission level" field setting ([0-00], see "Field settings" section in manual.

Common Installation Errors (cont.)

Symptom 7: Space heating capacity shortage at low outdoor temperatures

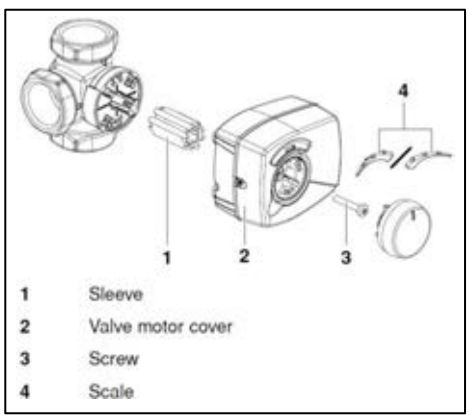
POSSIBLE CAUSES	CORRECTIVE ACTION
Backup heater operation is not activated.	Check that the "backup heater operation status" field setting [4-00] is turned on, see "Field settings" in manual. Check whether or not the thermal protector of the backup heater has been activated (refer to Main components, "Backup heater thermal protector" in manual for location of the reset button). Check if booster heater and backup heater are configured to operate simultaneously (field setting [4-01],see "Field settings" in manual) Check whether or not the thermal fuse of the backup heater is blown (refer to "Main components", "Backup heater thermal fuse" in manual for location of the reset button).
The backup heater balance point temperature has not been configured correctly.	Raise the 'balance point temperature' field setting [5-01] to activate backup heater operation at a higher outdoor temperature.
Too much heat pump capacity is used for heating domestic hot water (applies only to installations with a domestic hot water tank).	Check that the 'space heating priority temperature' field settings are configured appropriately: • Make sure that the 'space heating priority status' field setting [5-02] is enabled. • Raise the 'space heating priority temperature' field setting [5-03] to activate booster heater operation at a higher outdoor temperature.

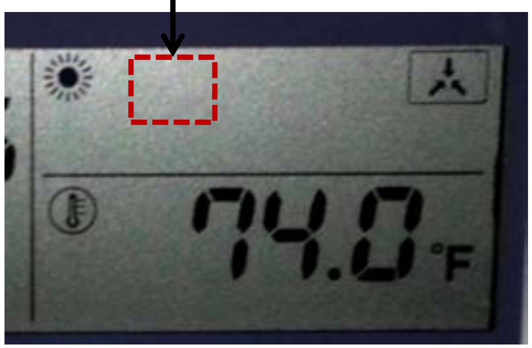
Common Installation Errors (cont.)

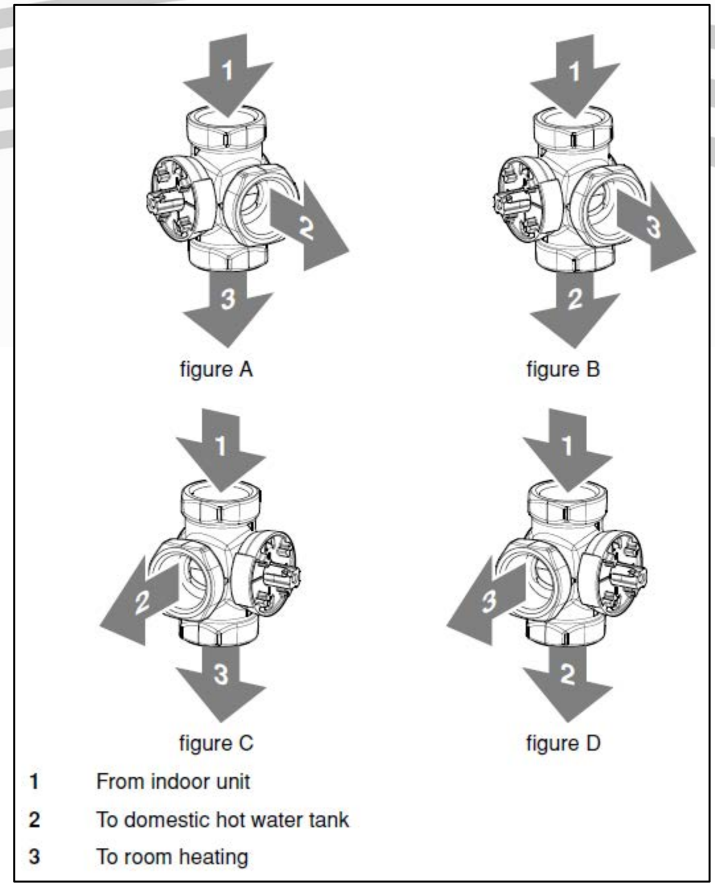
3-way valve Re-sync (DHW Tank Option)

If 3-way valve is installed and has been operated, but is not in sync due to installation error use the following steps to properly sync motor and valve body with installation.

1. **Turn OFF DHW mode and make sure the icon is not in user interface display.**
2. **Once 3-way valve motor has stopped rotating, the knob indicator will be in a 10 or 2 o'clock position.**
   Turn OFF power to condenser.
3. **Confirm 3-way valve install configuration using images on right, for more information see page 6 of DHW Tank Installation Manual.**





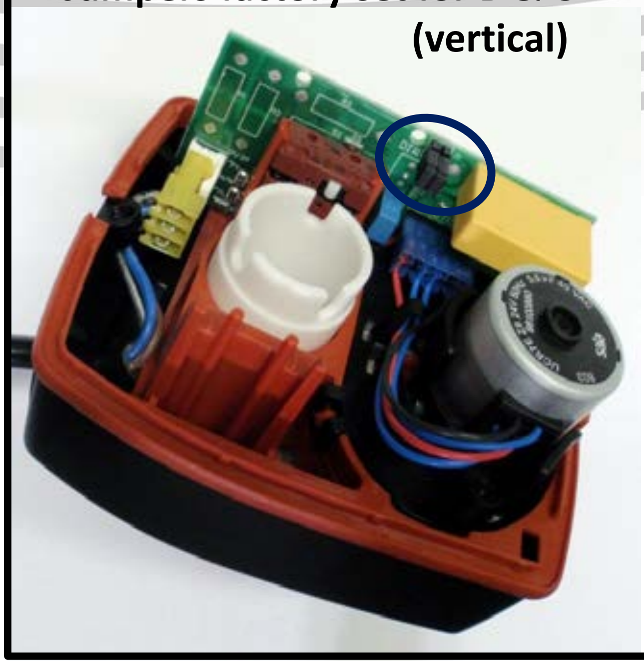


Common Installation Errors (cont.)

3-way valve Re-sync (DHW Tank Option) (cont.)

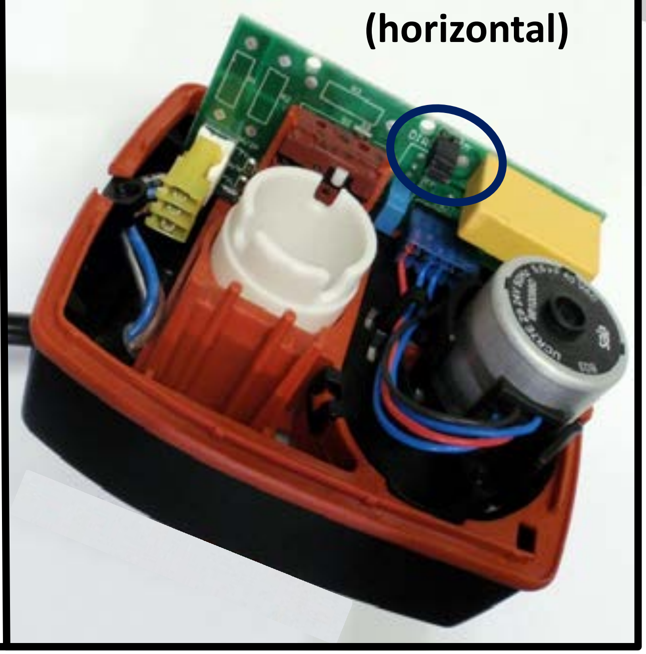
4. Open motor head and confirm jumper position using image on right.

Jumpers factory set for B & C (vertical)



Remove and rotate ¼ turn

Reinstall as shown for A & D (horizontal)



Common Installation Errors (cont.)

3-way valve Re-sync (DHW Tank Option) (cont.)

5. Assemble the stack as shown

Motor Stack Pieces

1 2 3

Take note of tabs on white barrel	Place orange ring on barrel, be sure to line up tabs	Install red and green pieces, green tab should be center of slot
		

Common Installation Errors (cont.)

3-way valve Re-sync (DHW Tank Option) (cont.)

6. **Replace cover and screw**

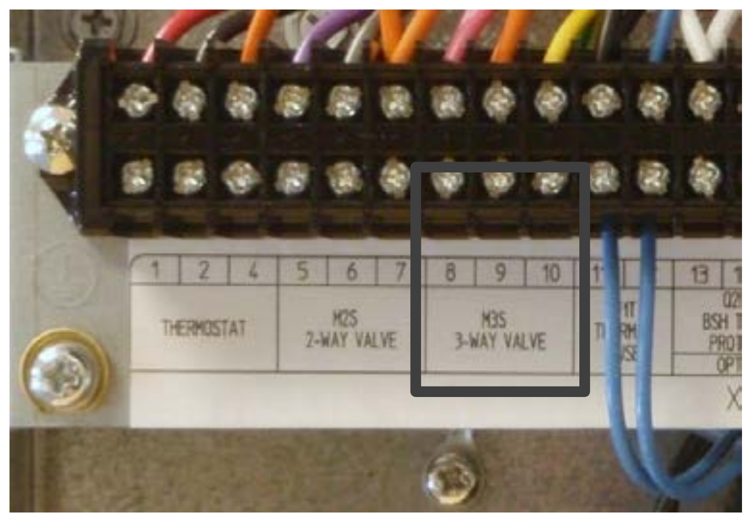
7. **Confirm wiring**

For A & B go to page 67, for C & D go to 68

3-way Valve	Altherma Control Box – X2M
Brown wire	Terminal 8
Blue wire	Terminal 9
Black wire	Terminal 10

Place cover on motor head and reinstall cover screw

X2M – Terminal Block



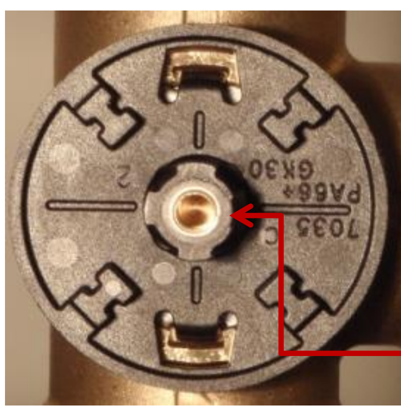
Common Installation Errors (cont.)

3-way valve (DHW Tank Option) (cont.)

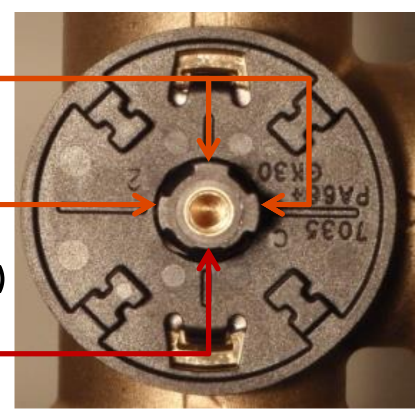
8. For both A & B configurations reset stem as shown below and reassemble, C & D proceed to next page
9. Once reassembly is complete turn back ON power, if when power was turned ON the valve motor operated, wait for valve to stop rotating, turn condenser OFF and repeat step 8.

A & B

3 Tabs



Flat Side (no tab)

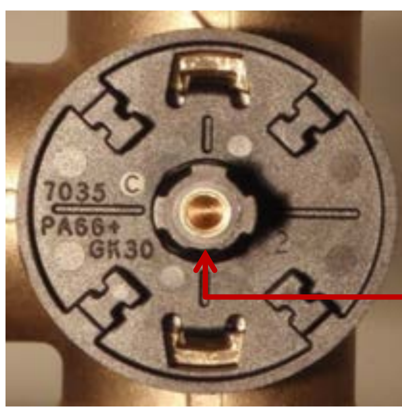


Common Installation Errors (cont.)

3-way valve (DHW Tank Option) (cont.)

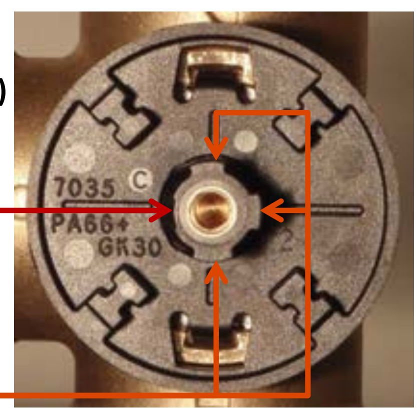
8. For both C & D configurations reset stem as shown below and reassemble
9. Once reassembly is complete turn back ON power, if when power was turned ON the valve motor operated, wait for valve to stop rotating, turn condenser OFF and repeat step 8.

C & D



Flat Side (no tab)

3 Tabs



DAIKIN altherma

R-410A INVERTER

Common Installation Errors (cont.)

3-way valve (DHW Tank Option) (cont.)

Now the valve can be operated normally.

For manual operation pull knob out to expose red ring, when red ring is exposed the valve’s motor is not engaged and can be operated manually. To reengage motor, rotate and push until knob snaps back into place.

When the knob is pressed fully into the motor, the knob cannot be operated by hand. Only the motor will control valve’s operation

If the knob's red ring is exposed valve can be operated manually.

Common Errors Codes

When a safety device is activated, the user interface LED will be flashing, and an error code will be displayed.

A list of all errors and corrective actions can be found in the table below. Consult the Altherma Service Manual for more information.

Reset the safety by turning all zones and DHW mode OFF and back ON.

Error code	Failure cause	Corrective action
7H	Flow failure (water flow too low or no water flow at all, minimum required water flow.	• Check that all shut off valves of the water circuit are completely open. • Check if the water filter needs cleaning. • Check that the unit is operating within its operating range (refer to "Technical specifications" in manual). • Also refer to "Charging water" in manual. • Make sure there is no air in the system (purge air). • Check on the manometer that there is sufficient water pressure. The water pressure must be >14.5 psi (water is cold). • Check that the resistance in the water circuit is not too high for the pump (refer to "Setting the pump speed“ in manual . • If this error occurs at defrost operation (during space heating or domestic water heating), make sure that the backup heater power supply is wired correctly and that fuses are not blown (or circuit breaker is not switched off). • Check that the pump fuse (FU2) is not blown.

Common Errors Codes (cont.)

Error code	Failure cause	Corrective action
UA	Malfunctioning of Field Setting Switch	Review all wiring and PCB settings
UF	Error in communication wiring / refrigerant shortage	Verify wiring between components and refrigerant gas charge
U4	Error is communication wiring	Verify wiring from outdoor to hydrobox unit
AA	Open circuit fuse for Backup Heater (BUH) or Booster Heater (BSH)	Check each fuse in circuit for completed wiring and continuity
EC	DHW Tank Temp too high (>192ºF/89ºC)	Check DHW Thermistor or Solar Pump Parameters
81	Error of Outlet Water Thermistor	Verify connection and resistance of Thermistor
8H	Outlet Water Temp too high (>149ºF/65ºC)	Verify Thermistor operation or check operation if tied with alternative heat source (i.e. boiler)

Common Errors Codes (cont.)

Error code	Failure cause	Corrective action
AC	Booster heater thermal protector is open (applies only to installations with a domestic hot water tank)	• Verify that the QL3 safety has been connected to the Altherma control box. X2M 13,14 terminals to Water Tank Q3L 3,4 terminals. • Reset the Q3L thermal protector in DHW tank.
C0	Flow switch failure (flow switch remains closed while pump is stopped)	• Secondary plump causing flow through hydronic section before Altherma starts • Check that the flow switch is not clogged with dirt.
F3	Too high discharge temperature (e.g. due to outdoor coil blockage)	Clean the outdoor coil. If the coil is clean, contact your local dealer.
E3	Abnormal high pressure	Check that the unit is operating within its operating range.
U0	Refrigerant failure (due to refrigerant leak)	Pressure test refrigeration circuit and check for leaks, 550 PSI test.
H9	Outdoor temperature thermistor failure (outdoor thermistor is broken)	Check resistance against chart in Altherma Service Manual
HC	Domestic hot water tank thermistor failure	Check resistance against chart in Altherma Service Manual

Easy Reference Section

Understanding Design & Application

To better understand the startup and service of the Daikin Altherma systems it is important to also understand basic principles of design and application. The next few pages will describe different ways of how the Altherma can be applied.

Basic Steps for selecting the correct Daikin Altherma

Design Step 1

Calculation of heat loss and heat gain.
Calculation of domestic hot water requirements.

Design Step 2

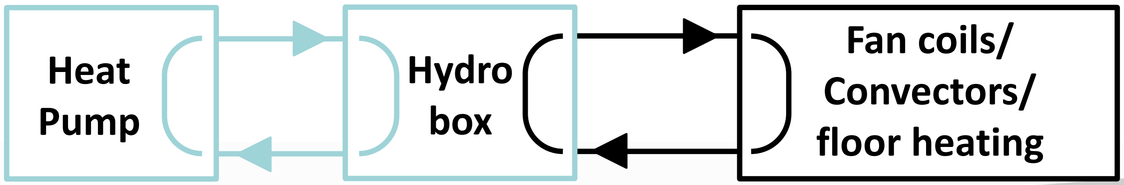
Decide the leaving water temperature range needed of heat/cool emitters that will cover the heat loss and heat gain.

Design Step 3

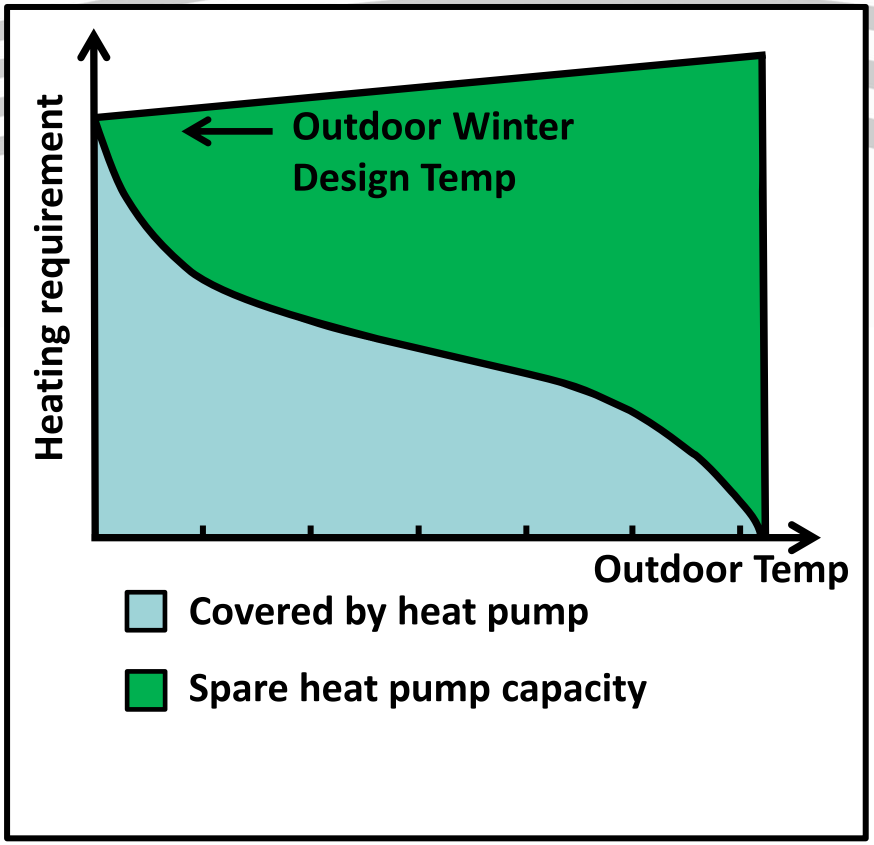
Selection of the Daikin Altherma system based on heat loss calculation and temperate range needed for heat emitters.

Tip: Use the available Daikin Altherma selection and software tools.

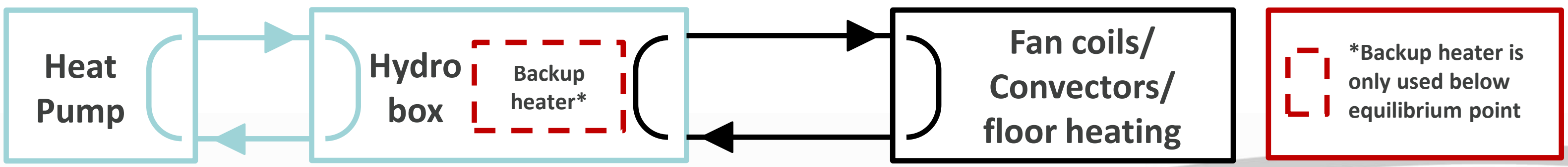
System Configuration – Mono-valent



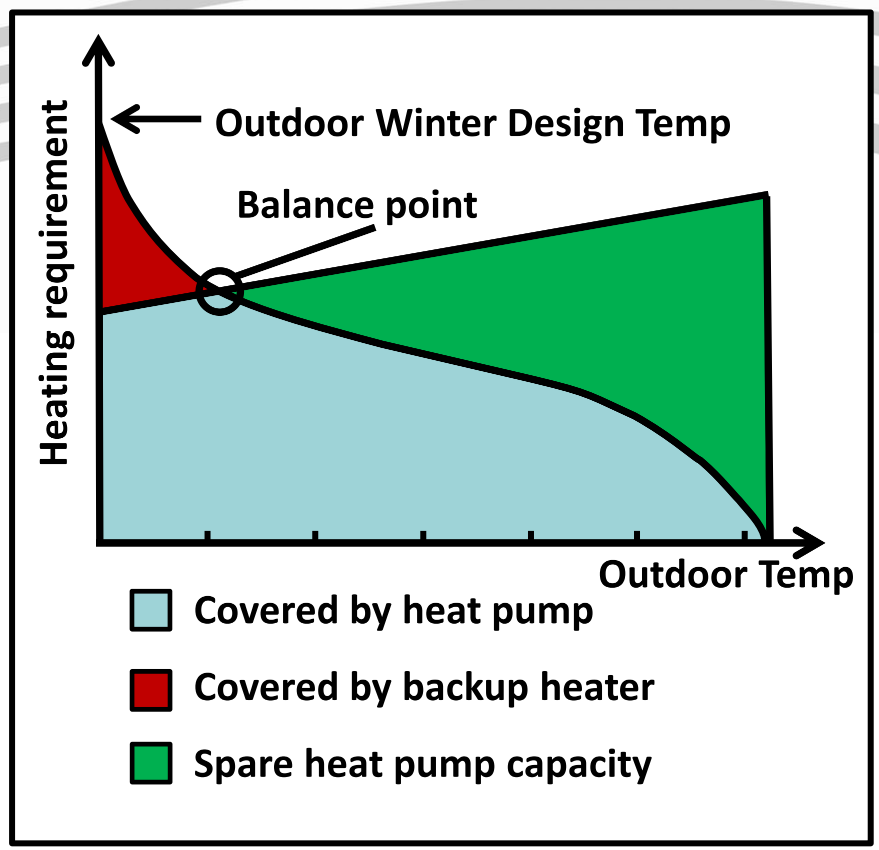
- Uses heat pump energy only
- Ideal for new construction (i. e. Net Zero designs, deep energy retrofits)
- 100% heat pump coverage: higher investment cost heat pump



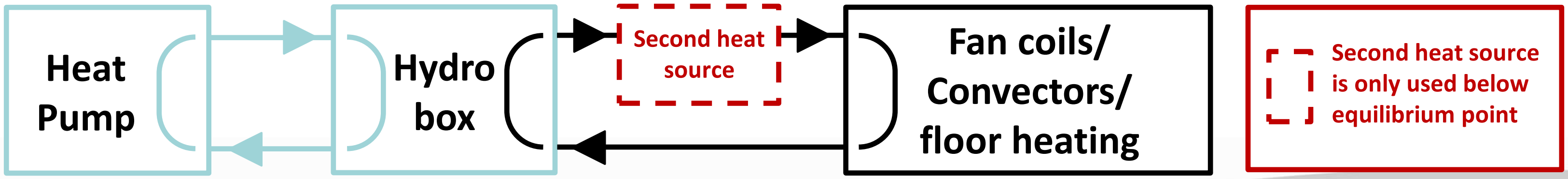
System Configuration – Mono-energetic



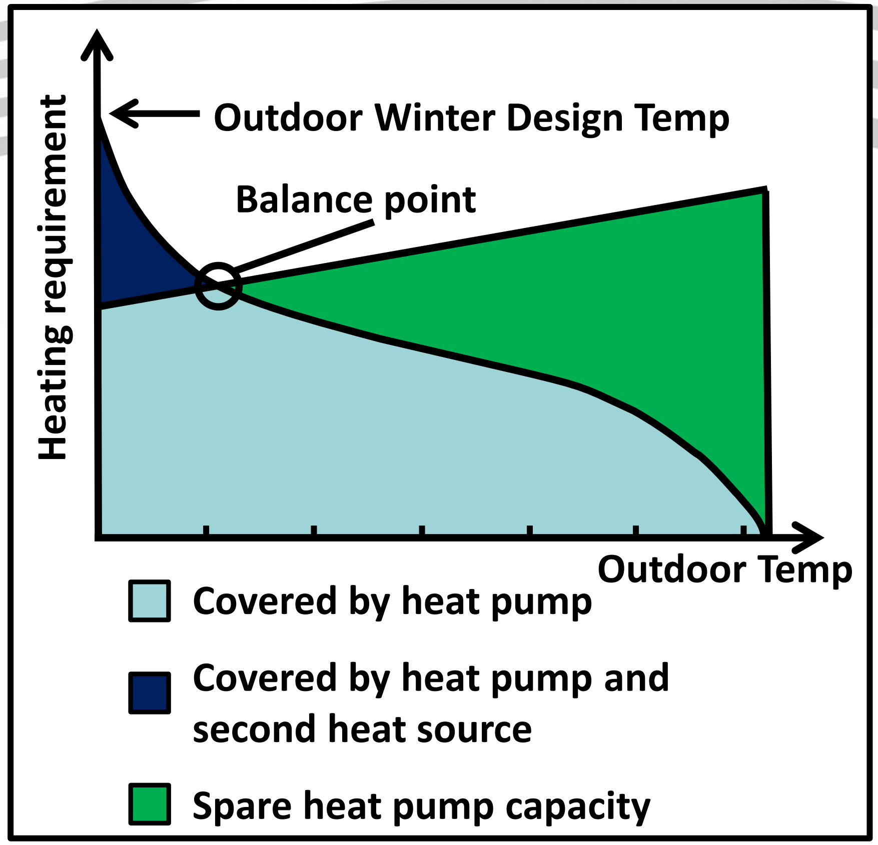
- Uses heat pump energy with internal electric backup heater
- Ideal for new construction
- Best balance between investment cost and running costs



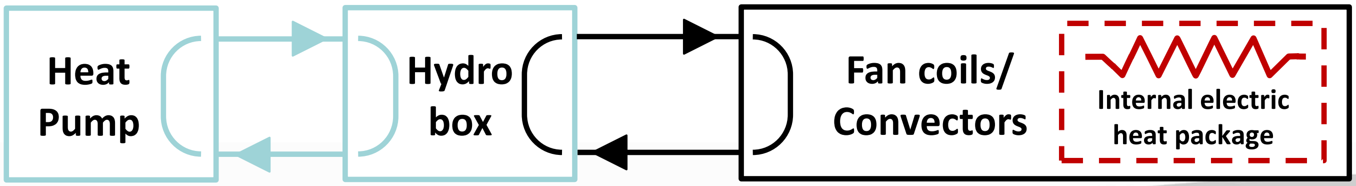
System Configuration – Co-valent Option 1



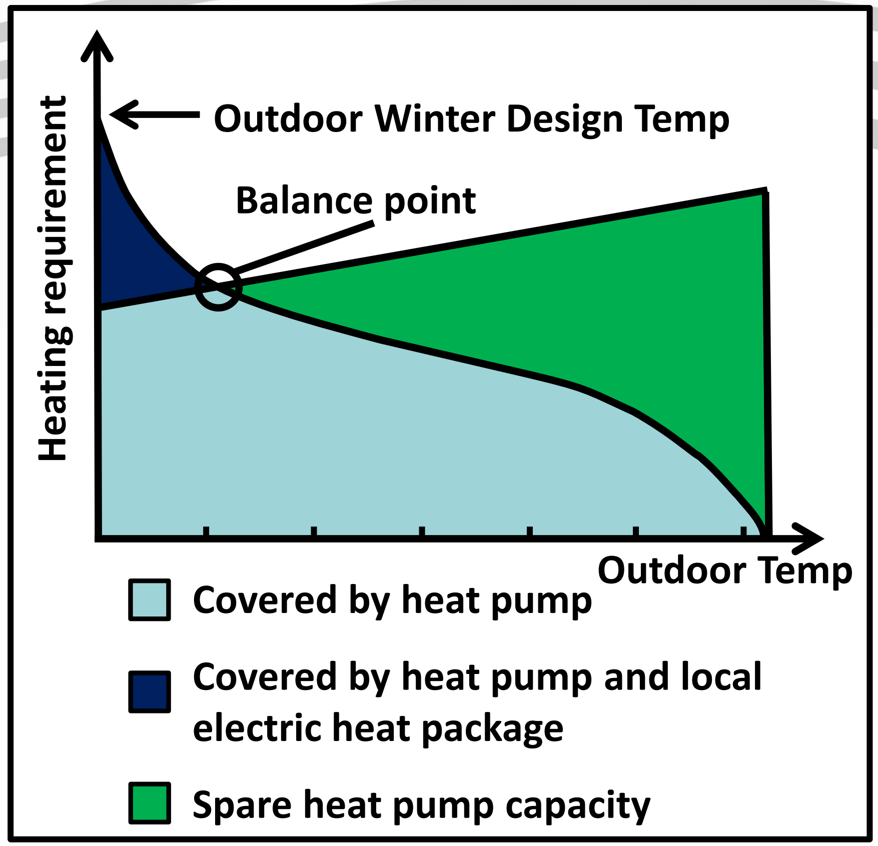
- Uses heat pump energy and second heat source
- Second heat source can be electric, oil or gas boiler
- Ideal for refurbishment/upgrade



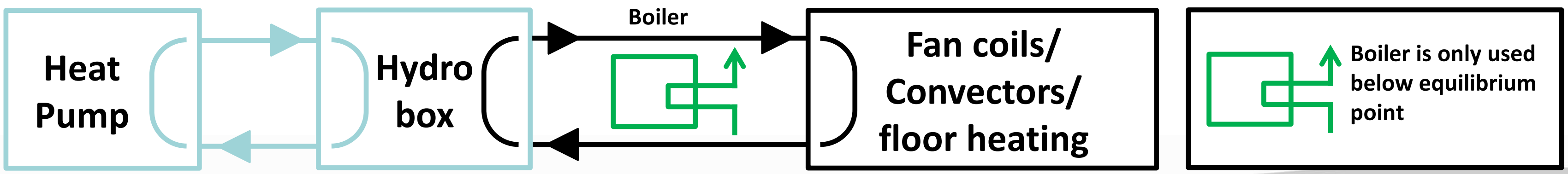
System Configuration – Co-valent Option 2



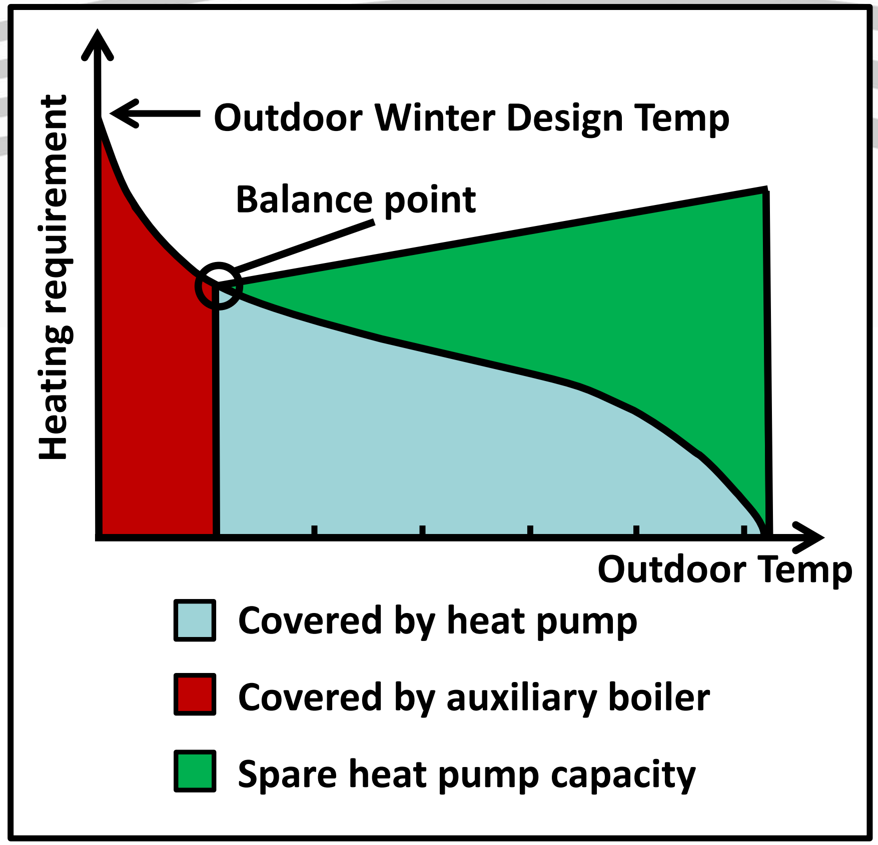
- Uses heat pump energy with local electric heat packages
- Electric packages can be easily staged by room thermostats
- Good balance between investment cost and running costs



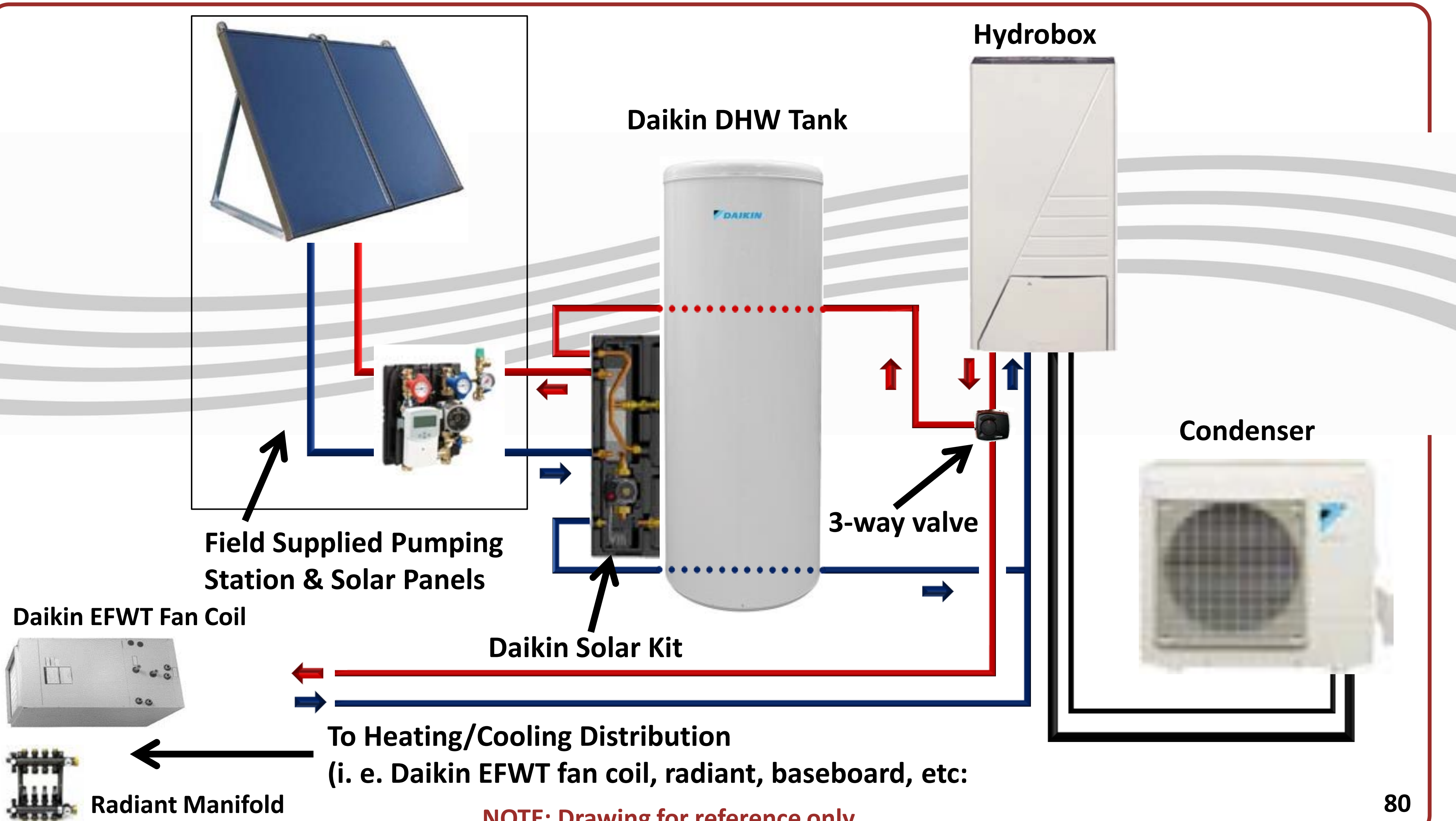
System Configuration – Bi-valent



- Uses heat pump energy with auxiliary boiler
- Ideal for refurbishment/upgrade
- Boiler can be, electric, oil or gas
- Once balance point is reached, heat pump shuts down and auxiliary boiler starts

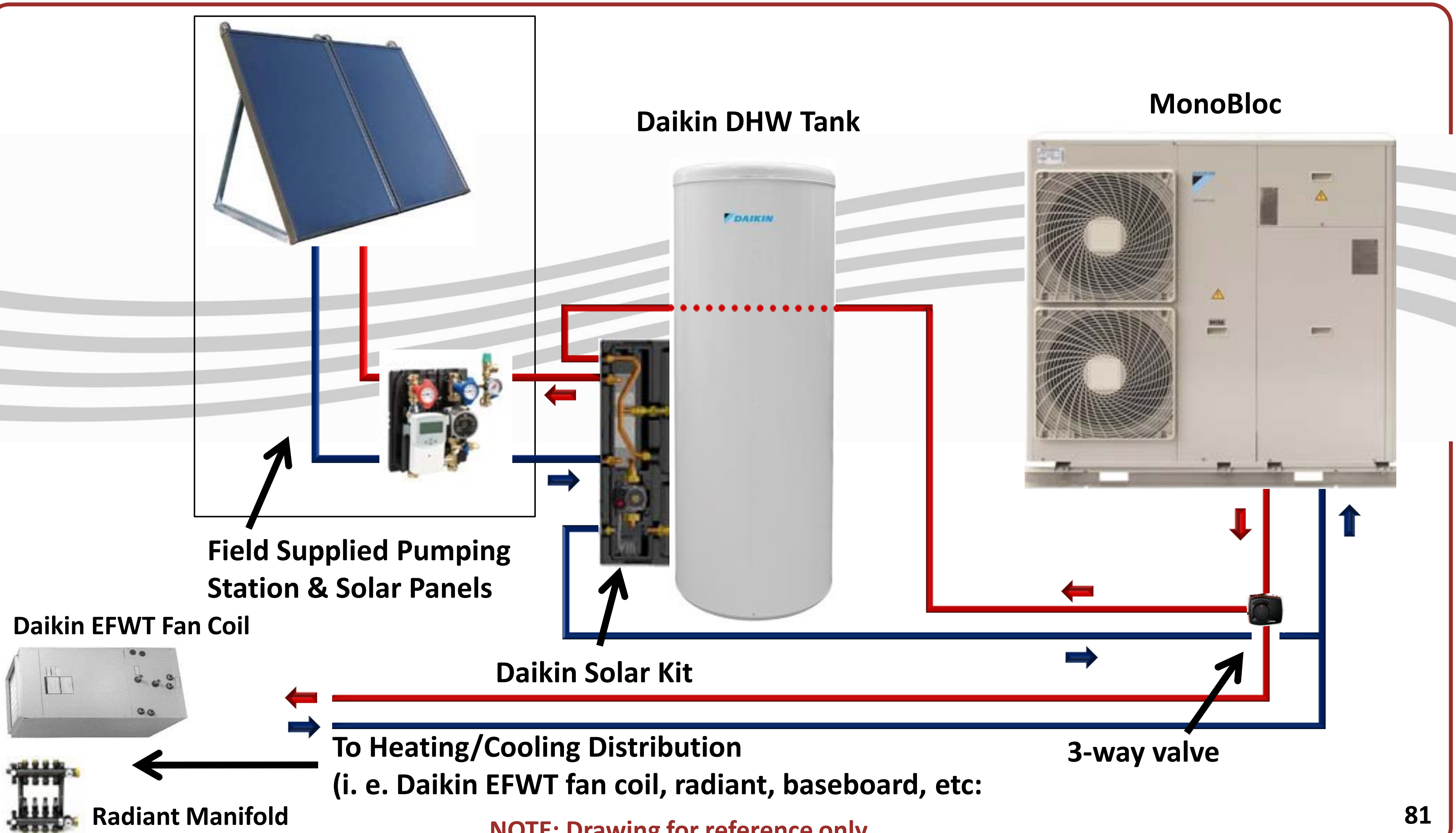


Split System Installation



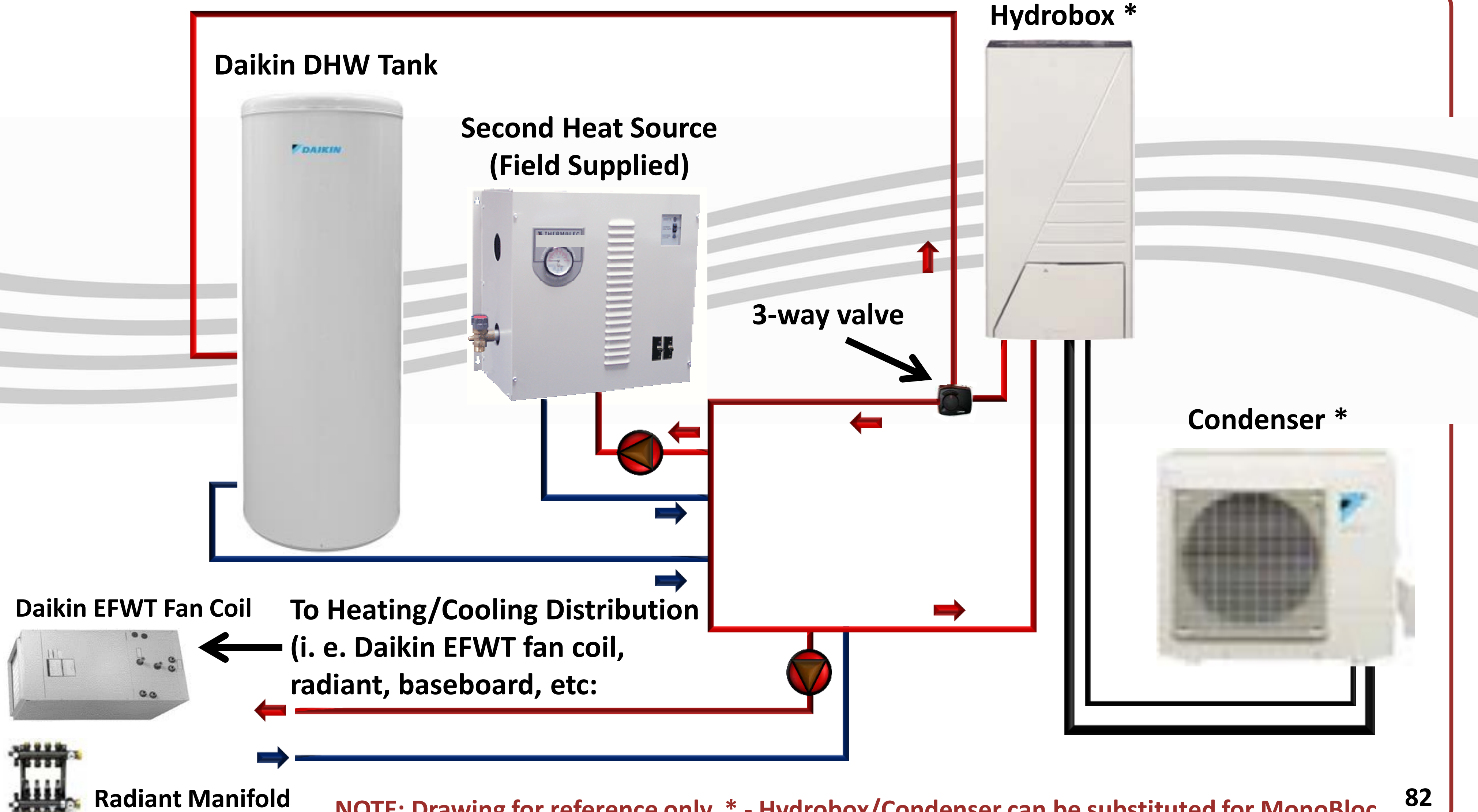
NOTE: Drawing for reference only.

MonoBloc Installation



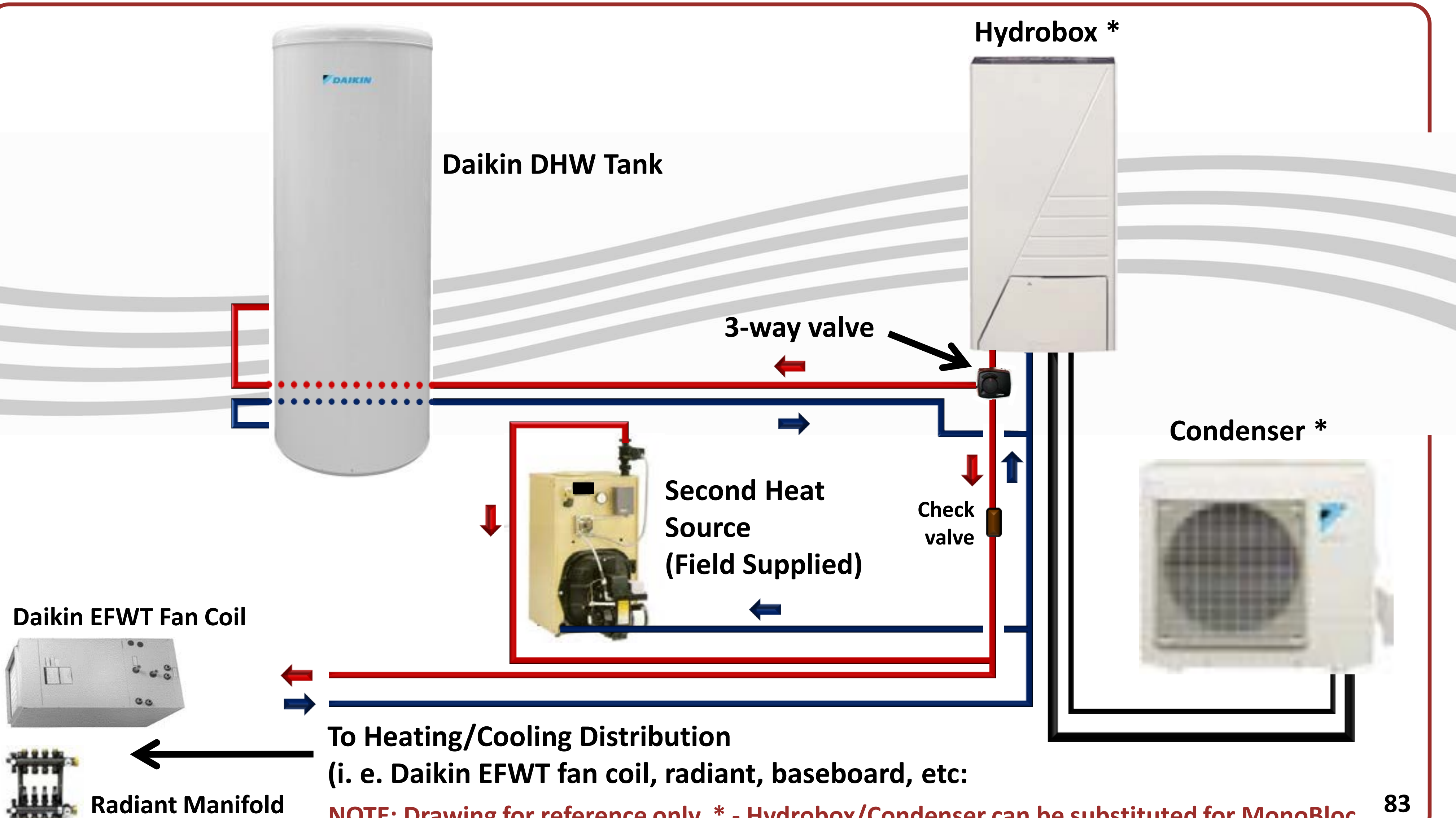
NOTE: Drawing for reference only.

Split System – Co-valent Parallel Piping



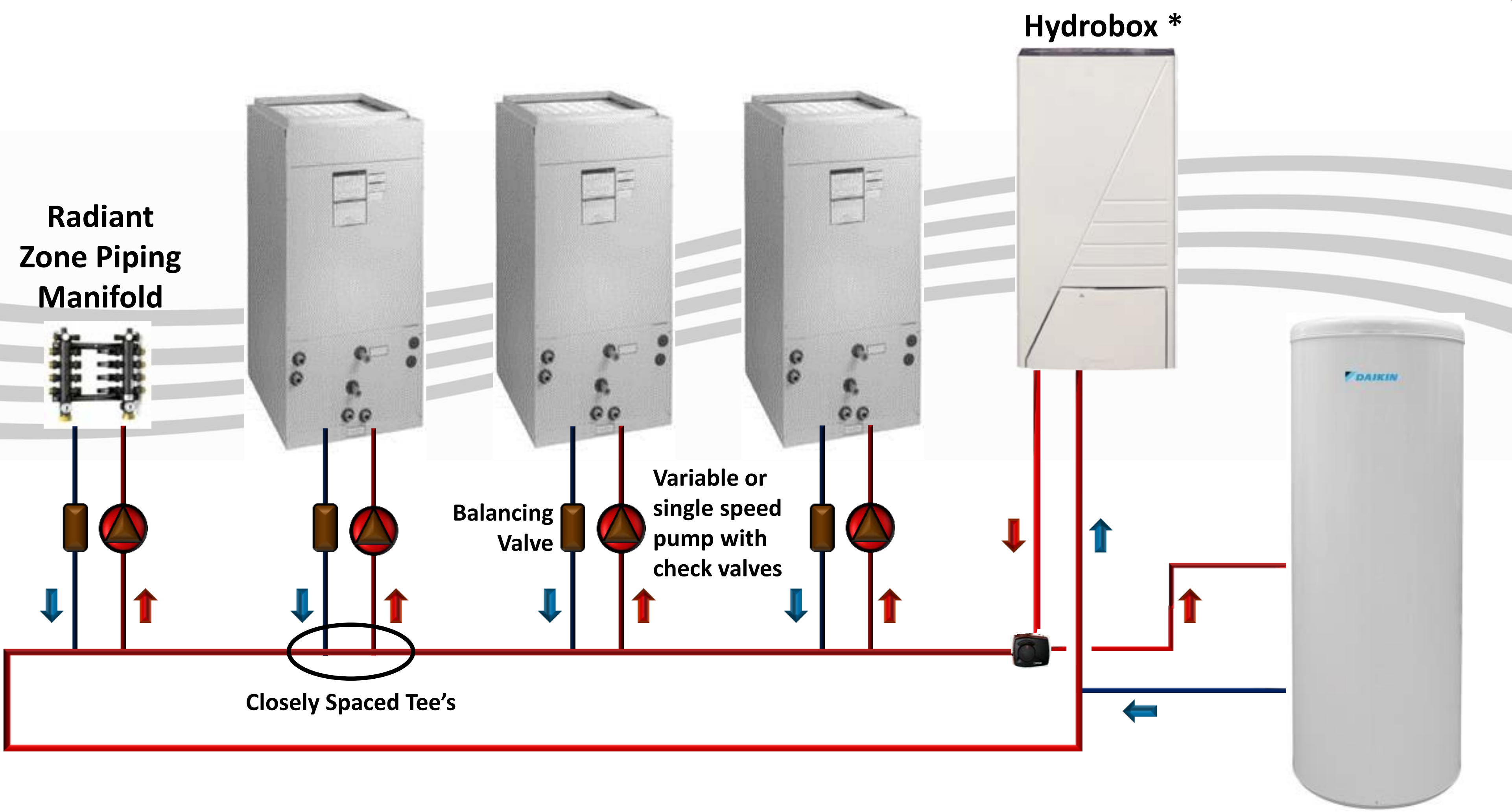
NOTE: Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc.

Split System – Bi-valent Parallel piping



NOTE: Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc.

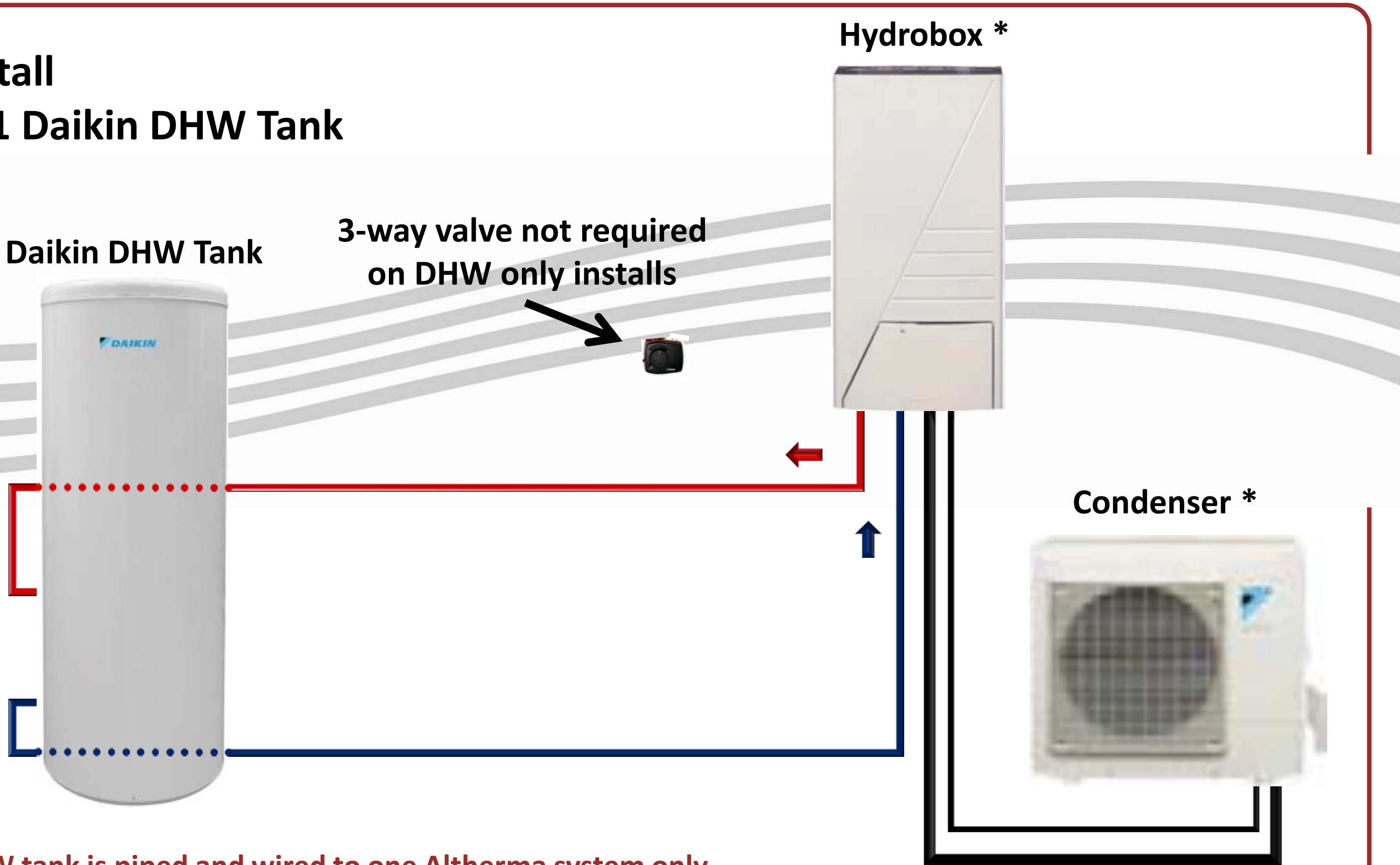
Loop Piping – Multiple Fan Coil with Radiant & DHW



NOTE: Drawing for reference only.

DHW Tank Piping – DHW Heat Exchanger Only

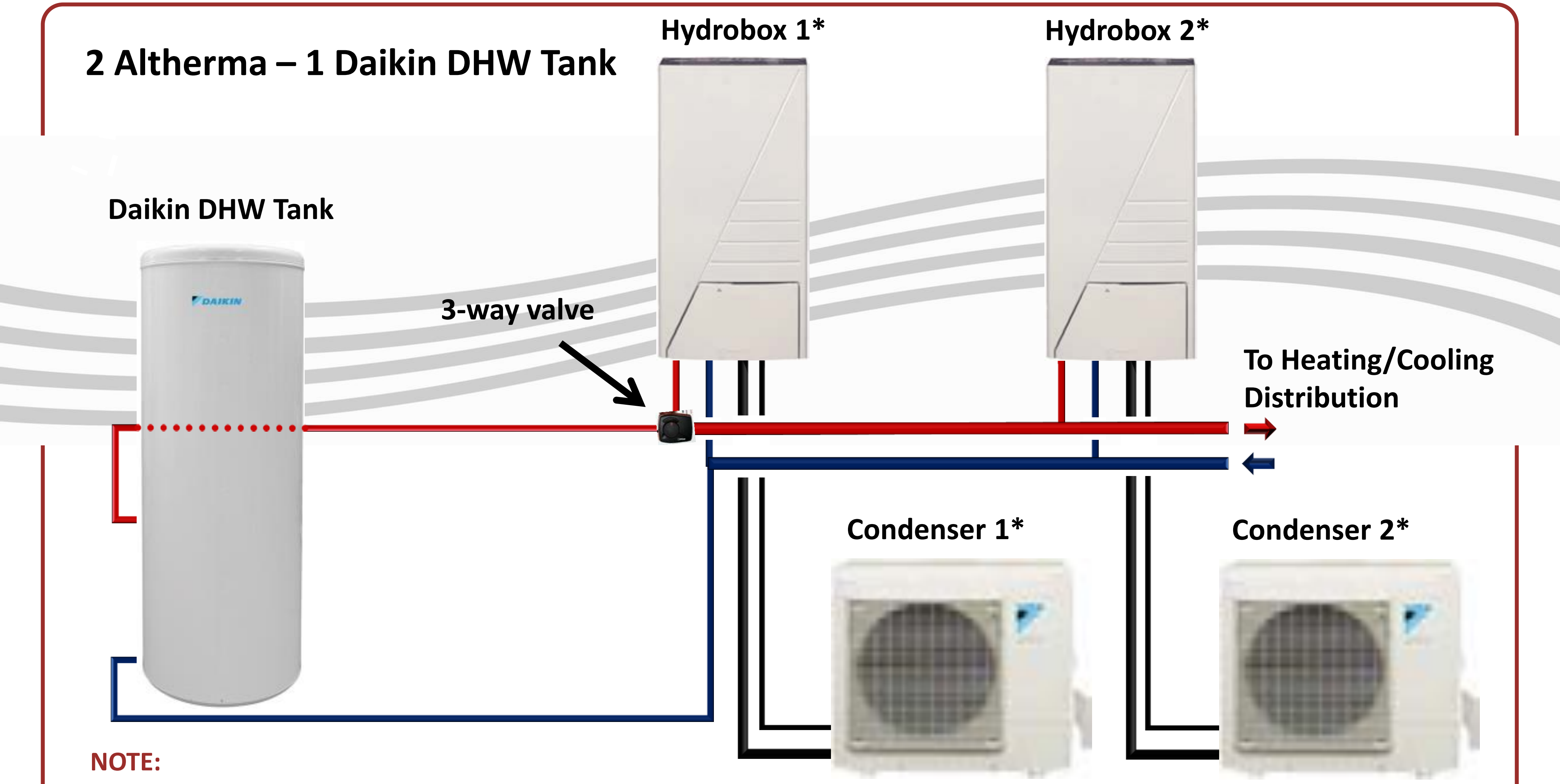
DHW Only Install
1 Altherma – 1 Daikin DHW Tank



NOTES:
- Each Daikin DHW tank is piped and wired to one Altherma system only.
- Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc. Relief valve, BSP/NPT adapters & isolation valves not shown.

DHW Tank Piping – DHW Heat Exchanger Only (cont.)

2 Altherma – 1 Daikin DHW Tank

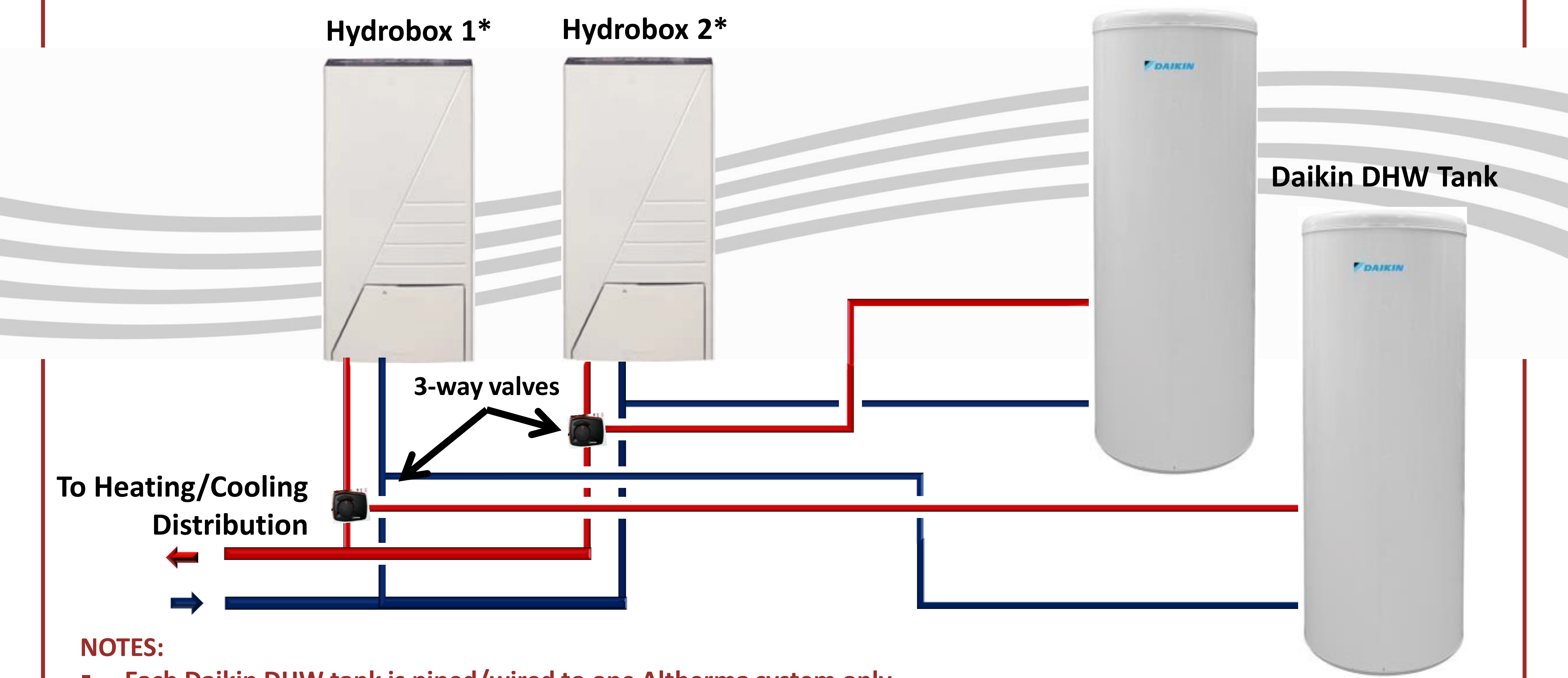


NOTE:

- Only one Altherma can connect to one Daikin DHW tank.

DHW Tank Piping – DHW Heat Exchanger Only (cont.)

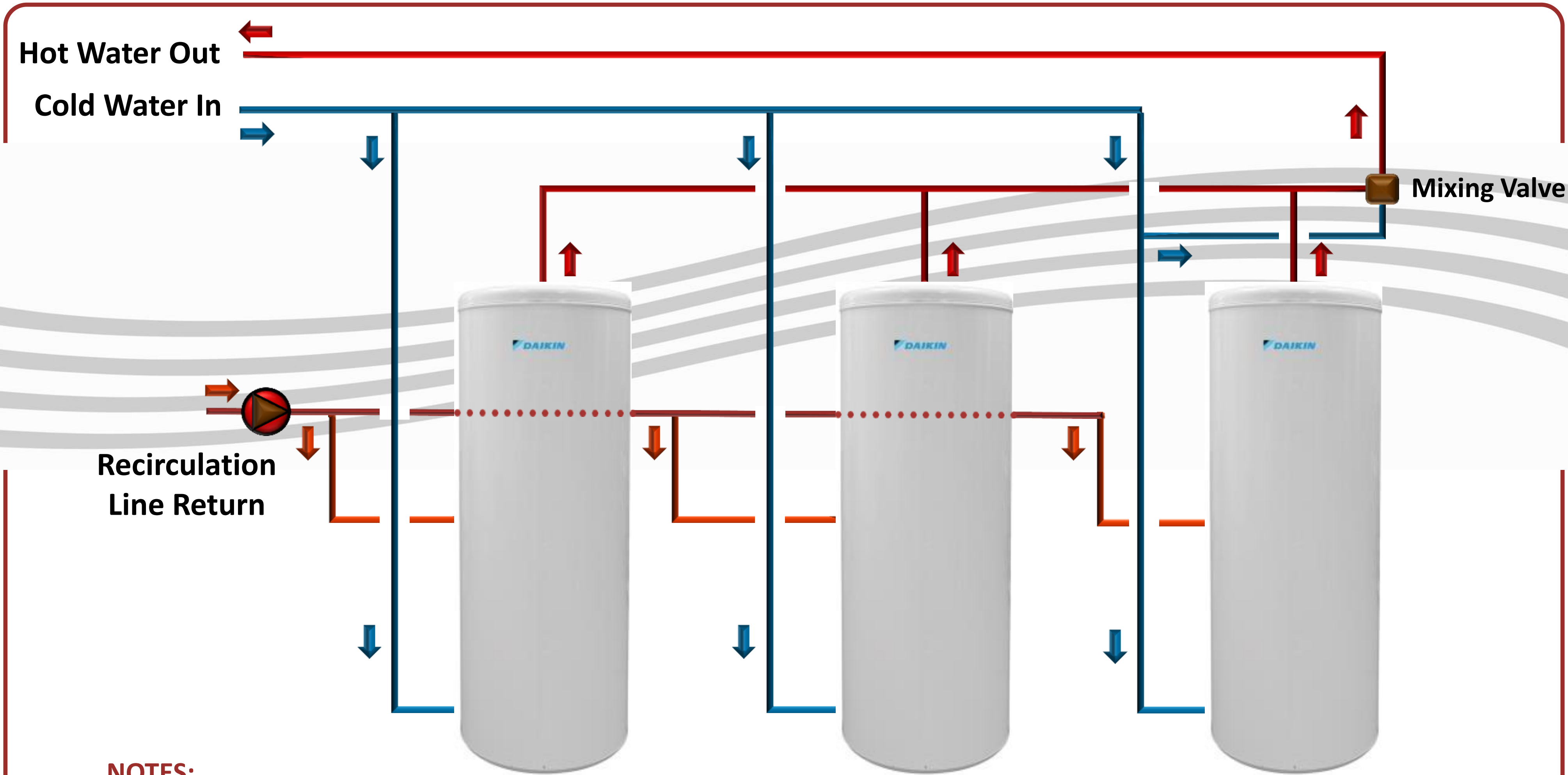
2 Altherma – 2 Daikin DHW Tanks



NOTES:

- Each Daikin DHW tank is piped/wired to one Altherma system only.
- Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc. Relief valve, BSP/NPT adapters & isolation valves not shown.

Multiple DHW Tanks – Domestic Piping Only

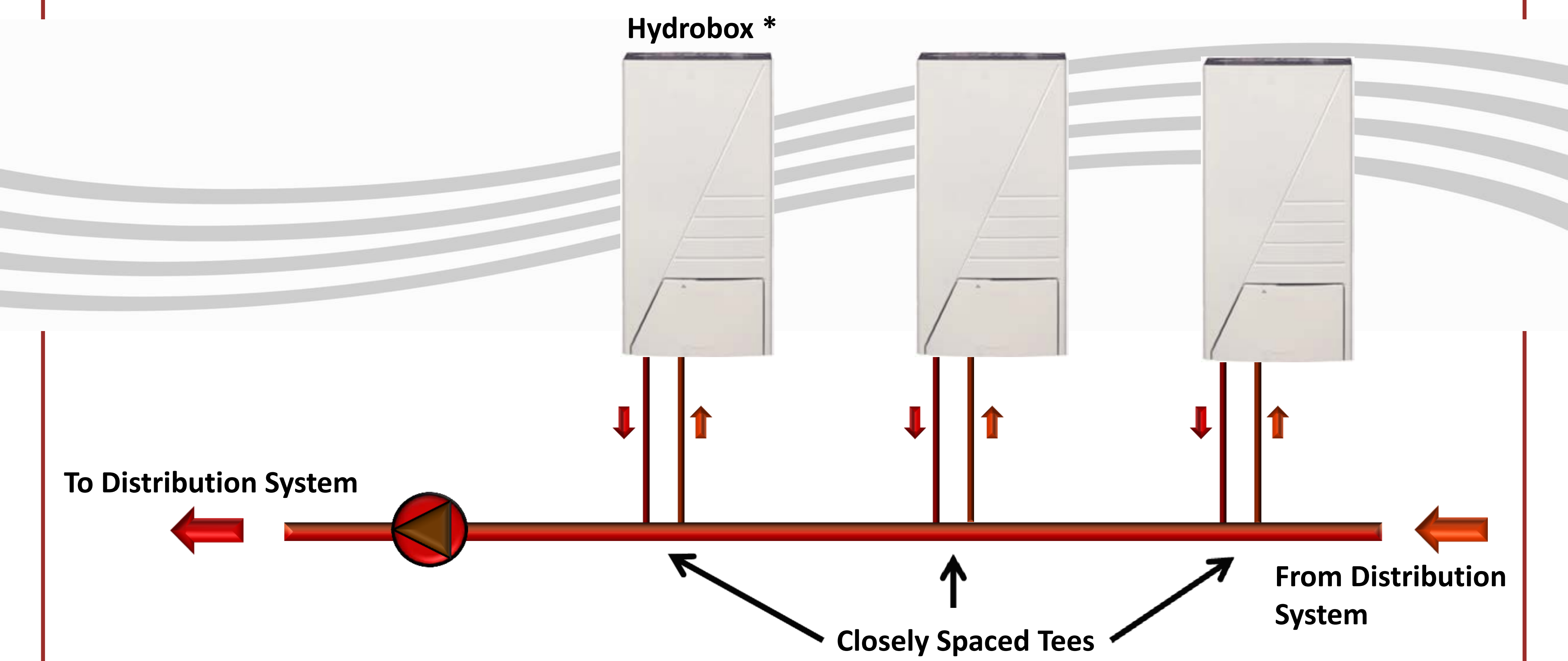


NOTES:

- Each Daikin DHW tank is piped and wired to one Altherma system only.
- Drawing for reference only. * - Hydrobox/Condenser can be substituted for MonoBloc. Relief valve, BSP/NPT adapters & isolation valves not shown.

Manifold Piping – Multi Altherma

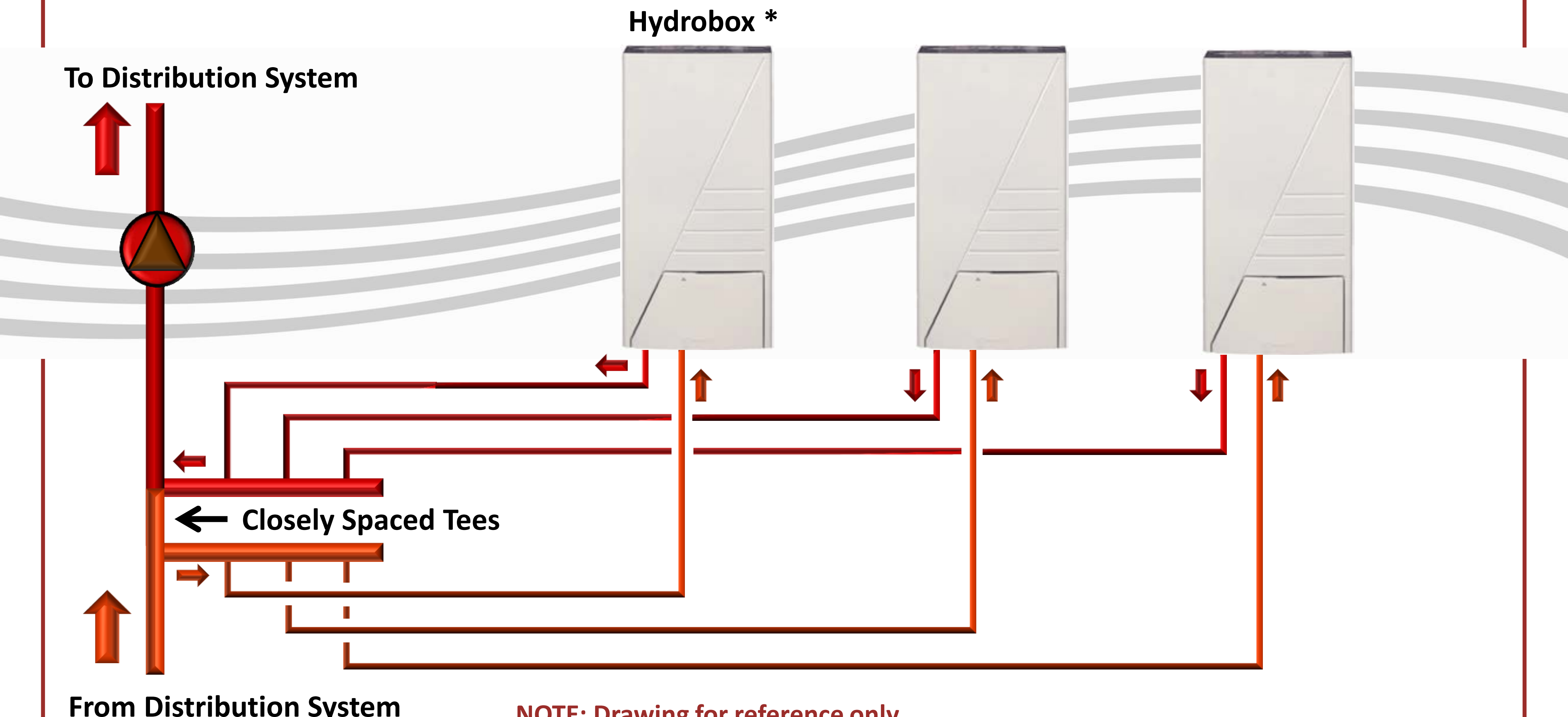
Series Primary Secondary Arrangement



NOTE: Drawing for reference only.
* - Hydrobox can be substituted for MonoBloc.

Manifold Piping – Multi Altherma (cont.)

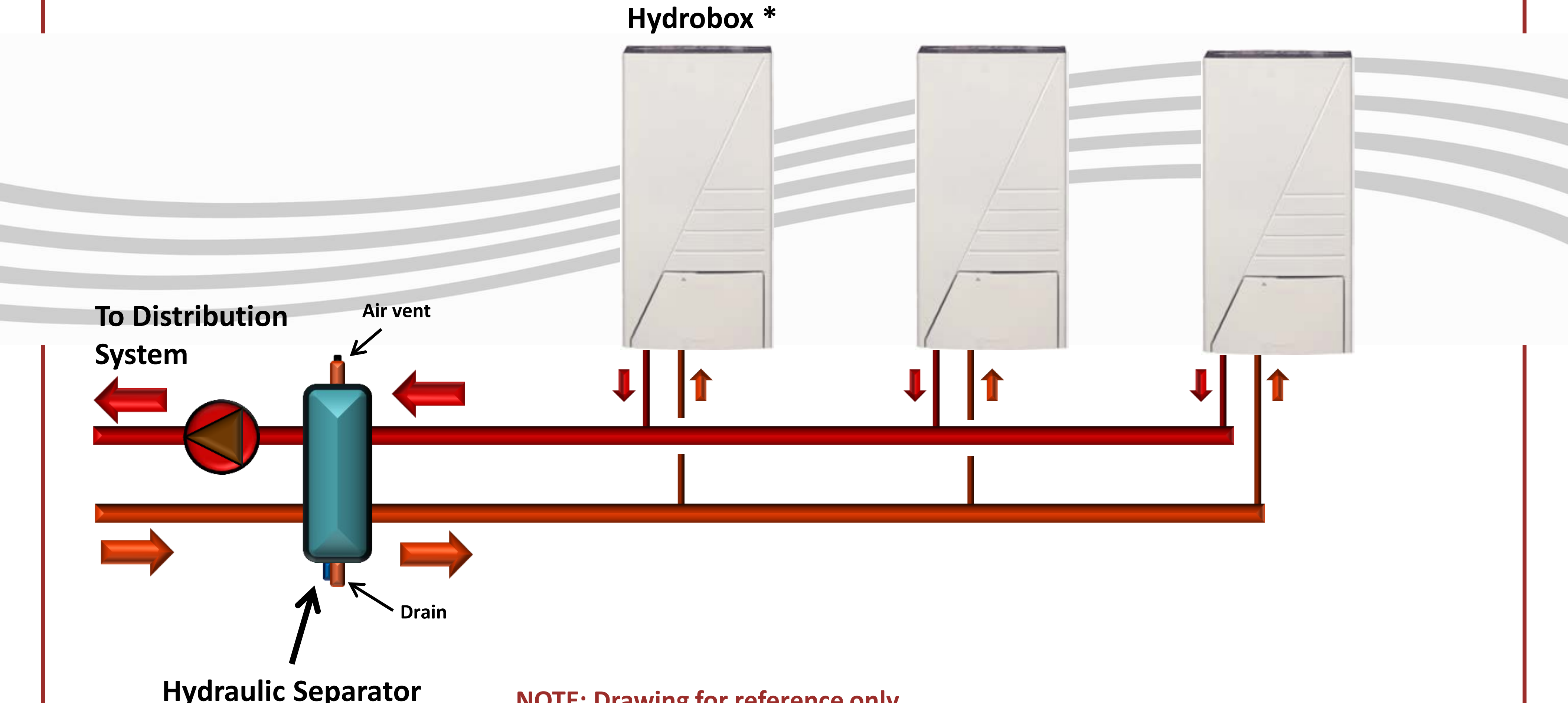
Parallel Primary Secondary Arrangement



NOTE: Drawing for reference only.
* - Hydrobox can be substituted for MonoBloc.

Manifold Piping – Multi Altherma (cont.)

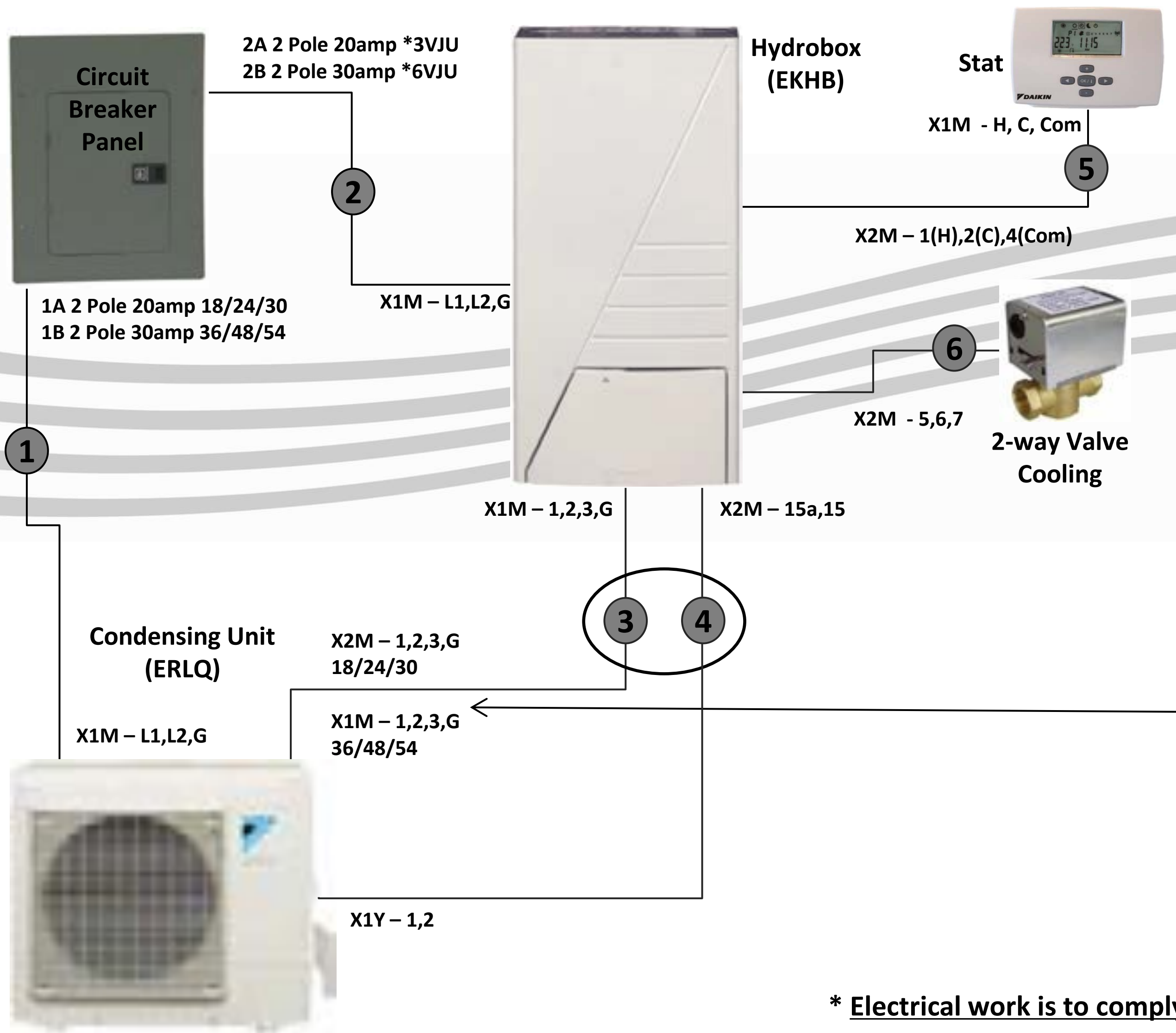
Hydraulic Separator Arrangement



NOTE: Drawing for reference only.

* - Hydrobox can be substituted for MonoBloc.

Field Wiring for Split System



Typical Wire & Breaker Sizes*			
	Wire #	Qty - Gauge	Notes:
Heating	1A	3 - #12	20amp 2 Pole
	1B	3 - #10	30amp 2 Pole
	2A	3 - #12	20amp 2 Pole
	2B	3 - #10	30amp 2 Pole
	3	4 - #12	- - -
	4	2 - #12	- - -
	5	2 - #18 min.	- - -
Cooling	6	Optional – 24VAC Circuit 100mA max. refer to 3rd party valve spec	

NOTE: Wires 1, 2 & Ground can have junctions if needed, but wire #3 should be run point to point, no junctions or breaks in between. This is to prevent communication errors.

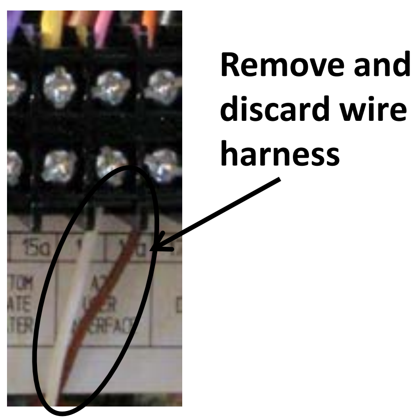
Wires: 3 & 4 can be run together*
Both sets of wires have 208/240VAC present

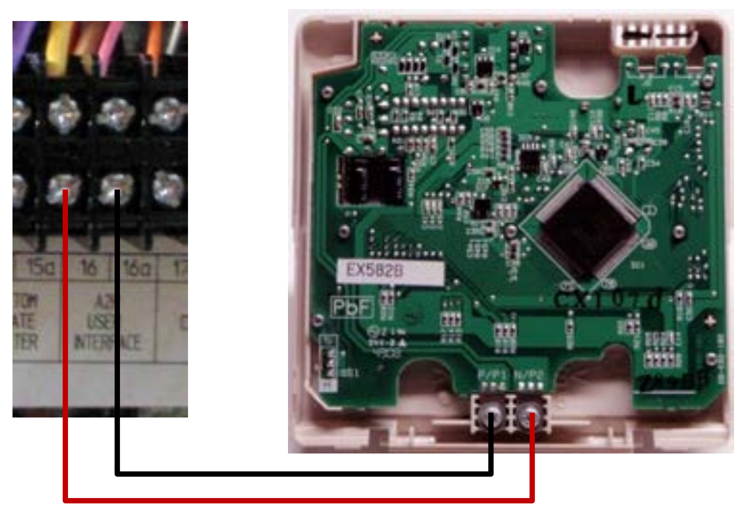
* Electrical work is to comply with ALL local electrical codes

Field Wiring for Split System – Relocation of User Interface

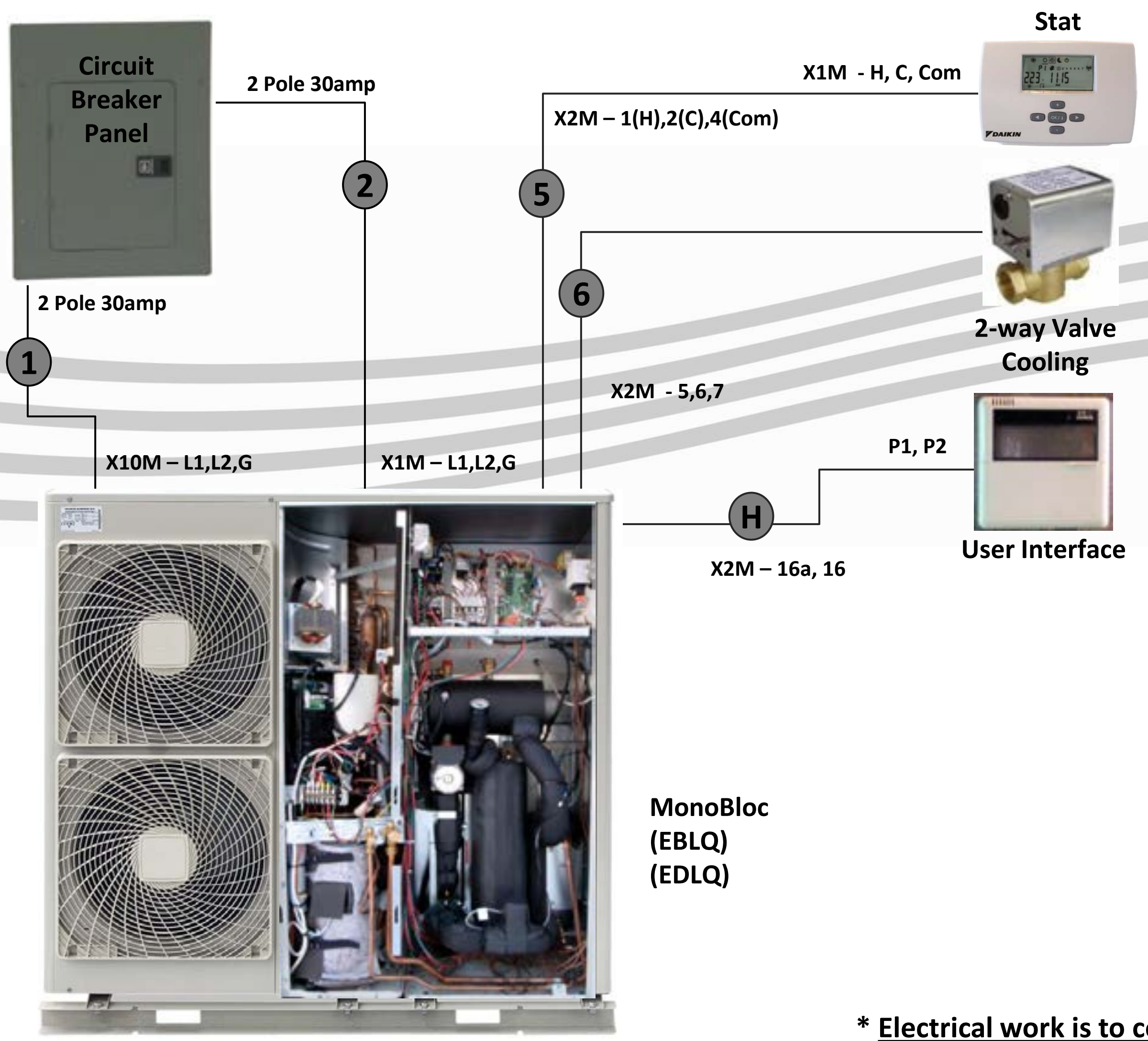
User Interface can be relocated if needed.

- Remove controller from front of Hydro-box and disconnect wires connected to P1/P2.
- Remove the disconnected wire harness from unit.
- Install new wire from Hydro-box (X2M-16/16a) to User Interface (P1/P2).
- These wire <u>should not have a junction in them</u>, run wires point to point
- Use 16 or 18 gauge wire, non-shielded, stranded copper wire.
- Maximum length can be 1,640 feet.





Field Wiring for MonoBloc



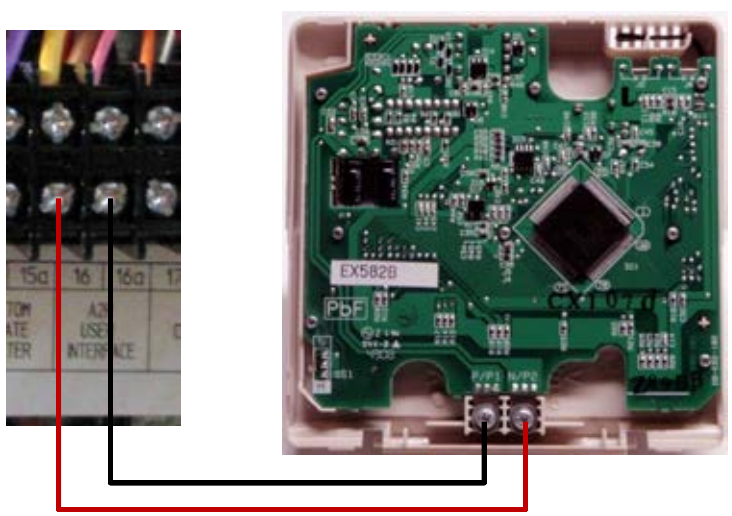
Typical Wire & Breaker Sizes*			
	Wire #	Qty - Gauge	Note:
Heating	1	3 - #10	30amp 2 Pole
	2	3 - #10	30amp 2 Pole
	5	2 - #18 min.	- - -
Cooling	6	Optional – 24VAC Circuit 100mA max. refer to 3rd party valve spec	
MonoBloc	H	2 - #18 (non-shielded stranded copper)	- - -

* **Electrical work is to comply with ALL local electrical codes**

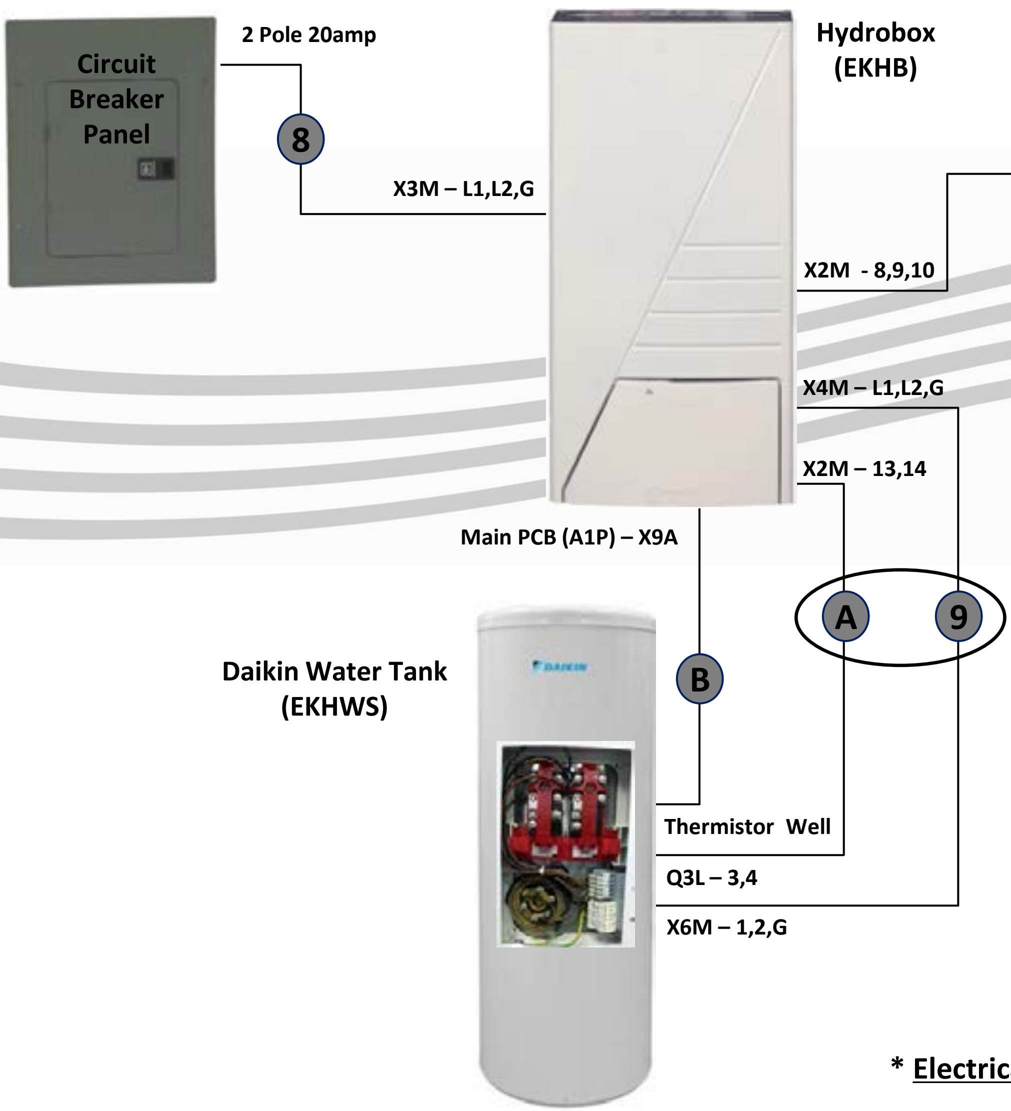
Field Wiring for MonoBloc – Installation of User Interface

Installing the User Interface.

- Find User Interface, it is packed in a box inside the MonoBloc unit.
- Remove back plate from controller using small flat screwdriver and mount controller in the desired location.
- Install wire from the MonoBloc's control box (X2M-16,16a) to back of User Interface (P1,P2).
- These wire <u>should not have a junction in them</u>, run wires point to point.
- Use 16 or 18 gauge wire, non-shielded, stranded copper wire.
- Maximum length can be 1,640 feet.



Field Wiring for DHW with Hydrobox



Typical Wire & Breaker Sizes*			
	Wire #	Qty - Gauge	Note:
Water Tank	7	3 - #16	- - -
	8	3 - #12	20amp 2 Pole
	9	3 - #12	- - -
	A	2 - #12	- - -
	B	Factory Supplied	DO NOT CUT OR EXTEND

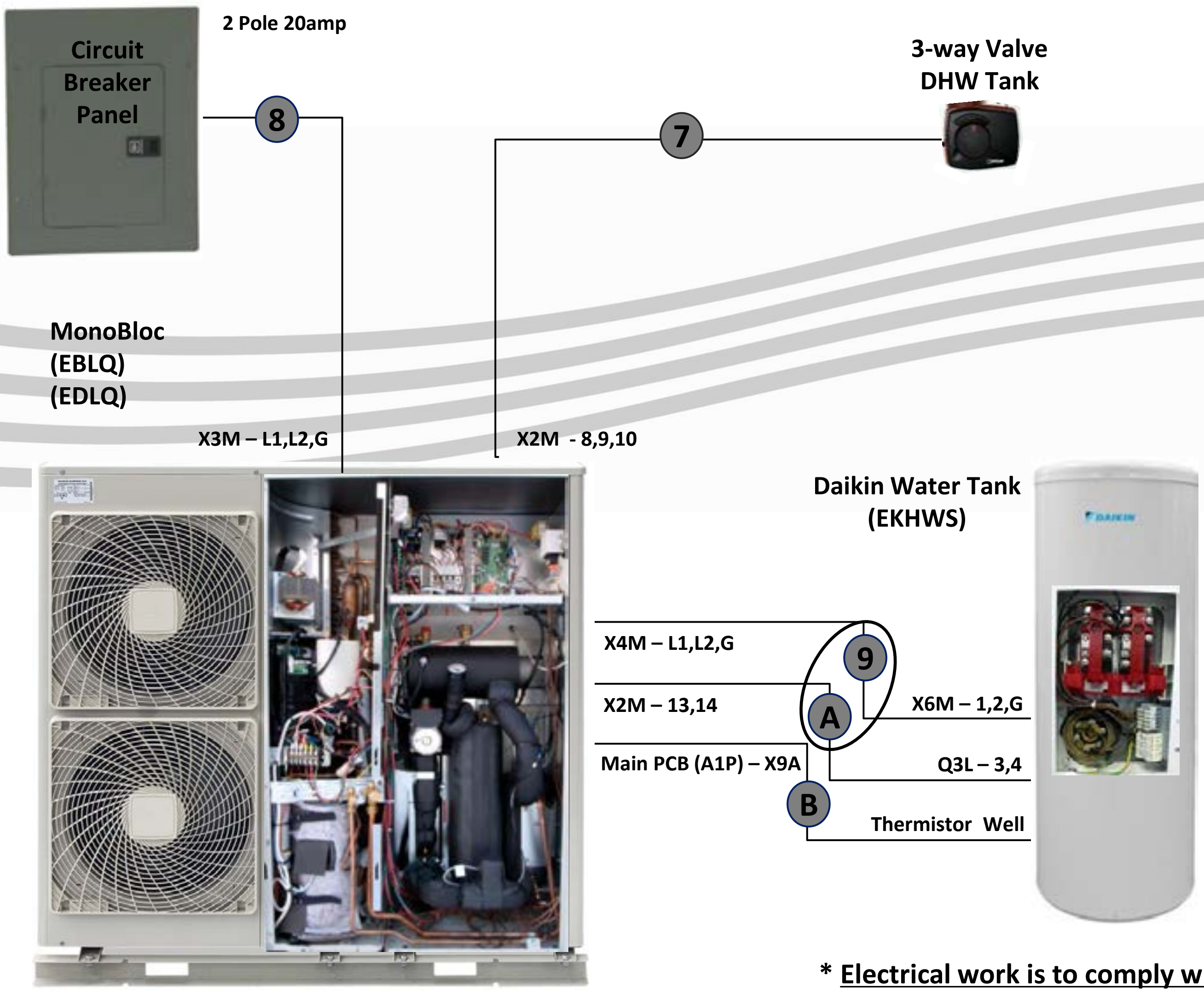
Only Wiring Related to DHW Tank option is shown, see installation manual of main unit for a complete wiring diagram.

Wires: A & 9 can be run together*
Both sets of wires have 208/240VAC present

K3M, F2B, X3M, X4M, Wire #B Tank sensor and 3-way valve supplied with Daikin Water Tank

* **Electrical work is to comply with ALL local electrical codes**

Field Wiring for DHW with MonoBloc



Typical Wire & Breaker Sizes*			
	Wire #	Qty - Gauge	Note:
Water Tank	7	3 - #16	- - -
	8	3 - #12	20amp 2 Pole
	9	3 - #12	- - -
	A	2 - #12	- - -
	B	Factory Supplied	DO NOT CUT OR EXTEND

Only Wiring Related to DHW Tank option is shown, see installation manual of main unit for a complete wiring diagram.

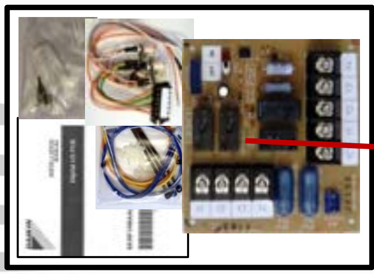
Wires: A & 9 can be run together*

K3M, F2B, X3M, X4M, Wire #B (tank sensor) and 3-way valve supplied with Daikin Water Tank

* Electrical work is to comply with ALL local electrical codes

Altherma Bi-valent Wiring for ERKP1HBAAU

EKRP1HBAAU comes with
A4P PCB
K5A, K6A, K7A relays
X7M terminal block
Screws and installation diagrams

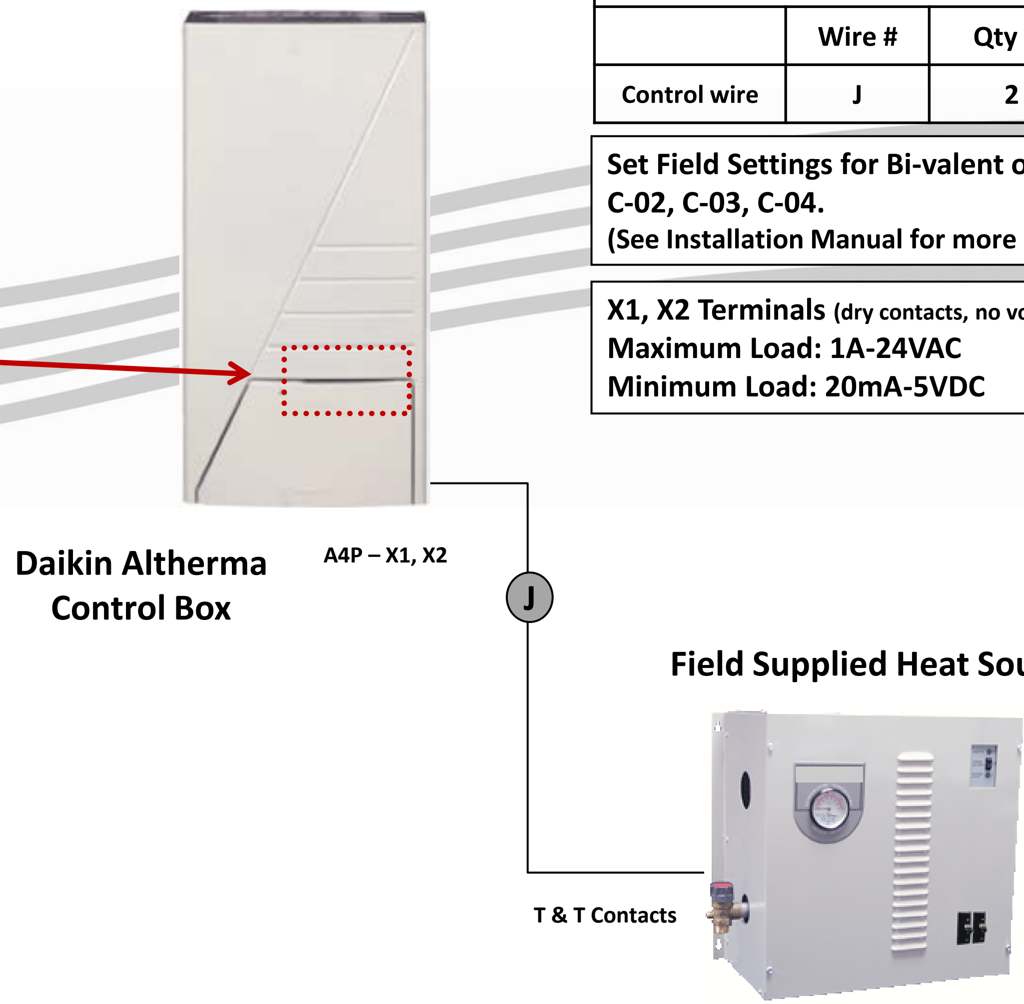


See page 198 for more information on PCB kit

Typical Wire Sizes*			
	Wire #	Qty - Gauge	Notes:
Control wire	J	2 - #18	- - -

Set Field Settings for Bi-valent operation:
C-02, C-03, C-04.
(See Installation Manual for more information)

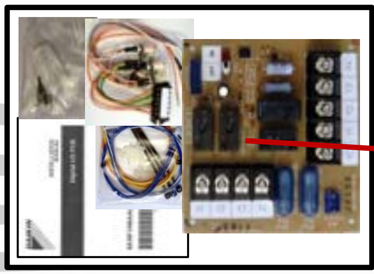
X1, X2 Terminals (dry contacts, no voltage present)
Maximum Load: 1A-24VAC
Minimum Load: 20mA-5VDC



* Electrical work is to comply with ALL local electrical codes

Altherma Co-valent Wiring for ERKP1HBAAU

This Co-valent scenario uses the Heating & Cooling ON/OFF outputs of the EKRP1HB Digital I/O PCB Kit – X7M 3, 4



See page 198 for more information on PCB kit

EKRP1HBAAU comes with
A4P PCB
K5A, K6A, K7A relays
X7M terminal block
Screws and installation diagrams

Daikin Altherma Control Box

X7M – 3, 4

K

T775
Field Supplied Outdoor Stat

T & T Contacts

Field Supplied Heat Source

In Co-valent applications the field supplied heat source takes the place of the internal backup heater.

Altherma & the second heat source are piped in series so the internal water pump of the Altherma can be utilized to move water through the other heat source.

It is important that the entering water temp to the Altherma is lower than 149°F/65°C, if higher an error and shut down will result.

Field Setting [4-00] = 0 – Disables backup heater

The field supplied outdoor stat should be set to the temperature at which additional heat is needed to maintain the load. Also the stat will need to be set to turn OFF the heat source at a higher outdoor ambient when no more heat is needed, example 60°F/15°C, this will stop the second heat source from running during cooling mode.

* <u>Electrical work is to comply with ALL local electrical codes</u>

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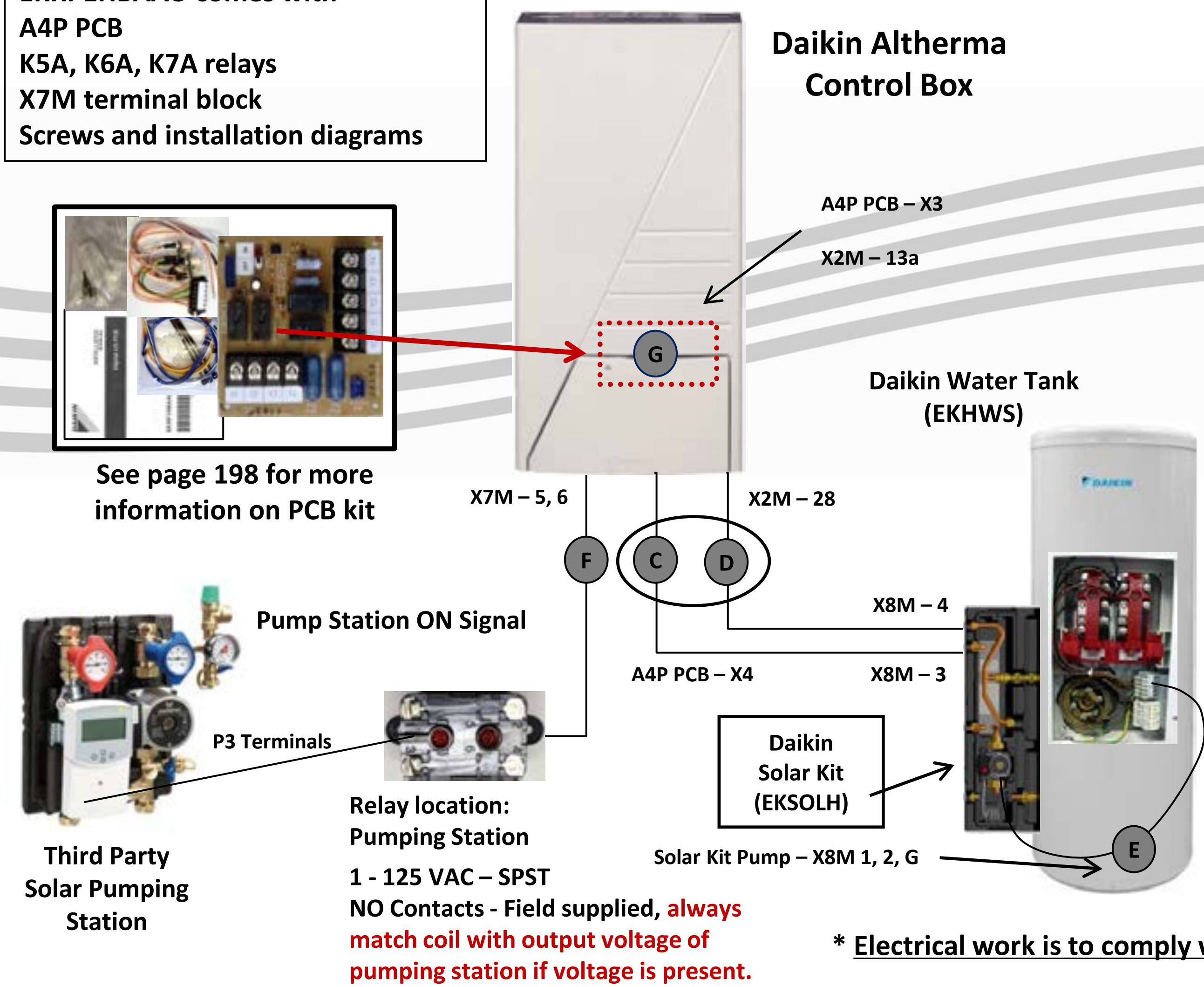
Field Wiring Daikin Solar Kit EKSOLHWBAVJU

EKRP1HBAAU comes with
A4P PCB
K5A, K6A, K7A relays
X7M terminal block
Screws and installation diagrams



Typical Wire Sizes*			
	Wire #	Qty - Gauge	Note:
Solar Kit	C	1 - #12	- - -
	D	1 - #12	- - -
	E	Factory Supplied	- - -
	F	2 - #18	- - -
	G	1 - #12	- - -

Only Wiring Related to Solar Kit option is shown, see installation manual of main unit for a complete wiring diagram.

Wires: C & D can be run together*

NOTE:
When the Pump Station's pump is active (solar energy available) X7M Terminals 5 & 6 must close in Altherma. Terminals 5 & 6 have 24 VAC across them. Signal from Pump Station should be dry contacts with no voltage present.

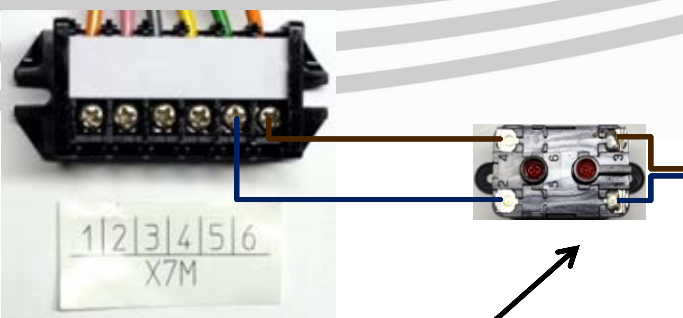
* Electrical work is to comply with ALL local electrical codes

Field Wiring Daikin Solar Kit EKSOLHWBAVJU (cont.)

Solar Pump Station Control

- This typical solar control has a optional pump connection (P3). This connection is 125 VAC. Install a isolation relay between control and X7M terminals.

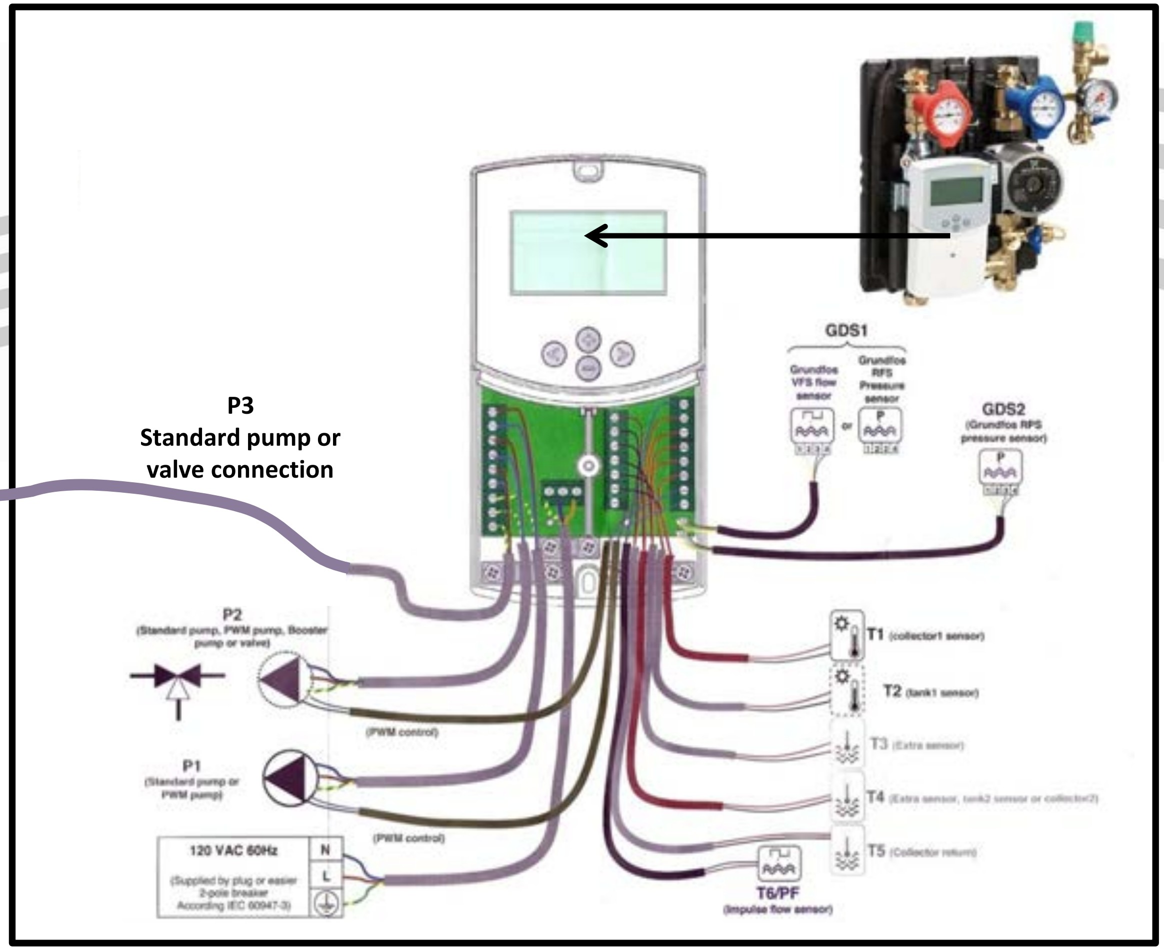
Altherma X7M – 5, 6



Relay location:
Solar Pump Station

1 - 120 VAC – SPST
NO Contacts - Field supplied
Always match coil with output voltage of pump station output if voltage is present.

Typical Pump Station Control



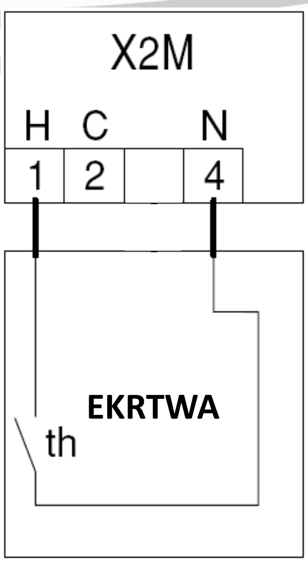
* Electrical work is to comply with ALL local electrical codes

Control Wiring

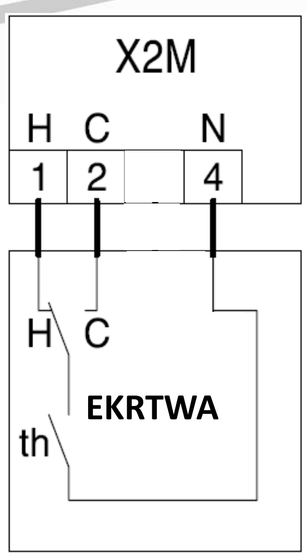
Connection of the Daikin thermostat

- **The Daikin thermostat is for <u>Radiant applications only</u>, no fan operation available**
- **When installing a EFWT fan coil, it is recommended to use a third party thermostat that can control fan operation on hydronic applications**

Heating only



Heating/Cooling



EKRTWA

NOTE:
24VAC is present between terminals 1 & 4 and 2 & 4

* <u>**Electrical work is to comply with ALL local electrical codes**</u>

Control Wiring (cont.)

Connection of the third party thermostat/control

Heating only

X2M		
Heating		Com
1		4

Heating/Cooling

X2M		
Heating	Cooling	Com
1	2	4

NOTE:
24VAC is present between terminals 1 & 4 and 2 & 4

- **Third party controls can be used on Daikin Altherma**
- **Dry contacts only (voltage free)**
- **Be careful when opposing control voltages are present**
- **Isolation relays may be needed depending on application**

Simultaneous Call

It is important when wiring multiple zones that precautions are taken so that a simultaneous call for Heat & Cool cannot occur. In the event that a simultaneous call does occur for Heat & Cool, the unit will stop operating until one of the calls is removed. DHW mode will still operate normally during a simultaneous call.

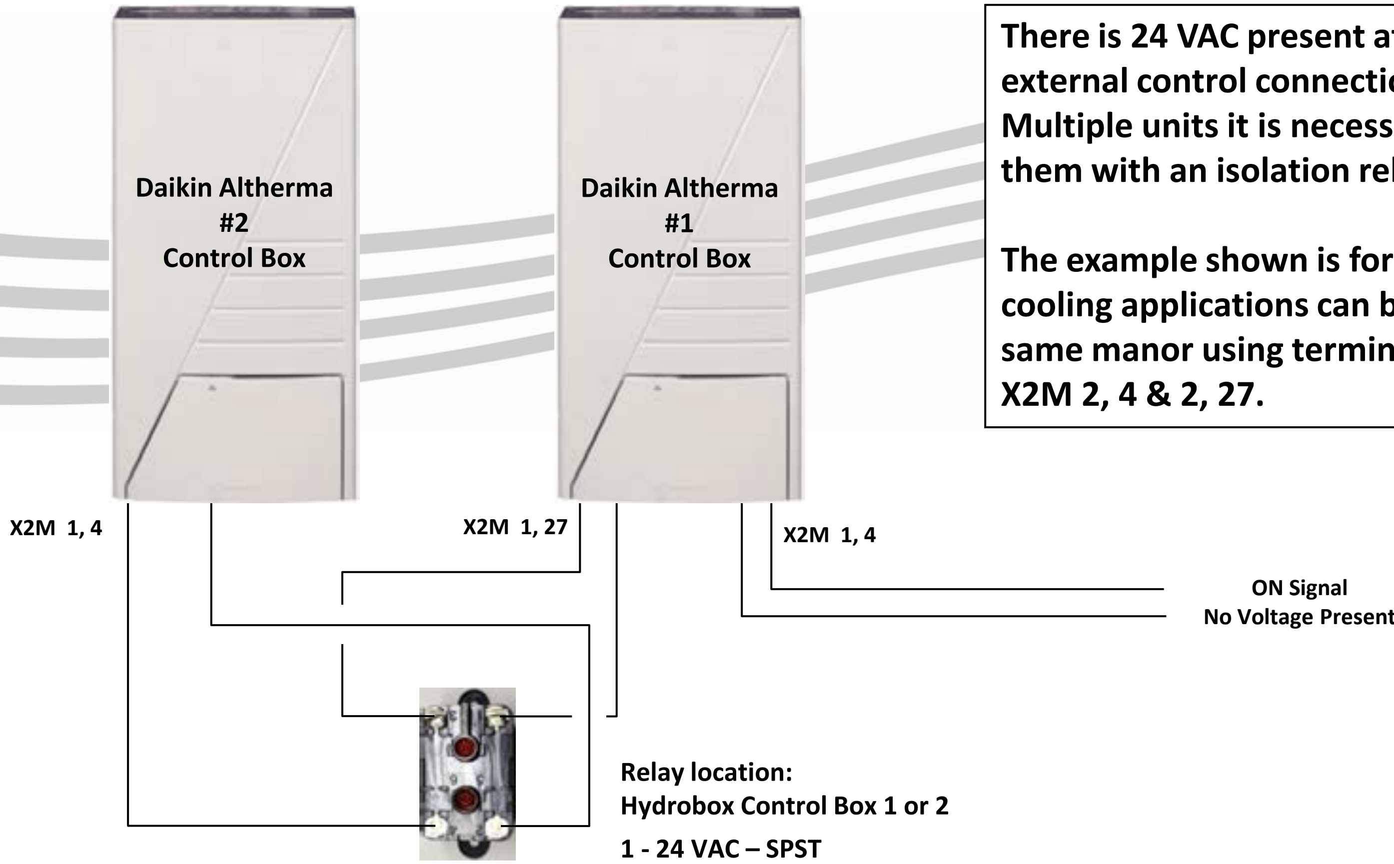
*** Electrical work is to comply with ALL local electrical codes**

Control Wiring (cont.)

Multi Daikin Altherma Wiring

There is 24 VAC present at each Altherma external control connection, when wiring Multiple units it is necessary to separate them with an isolation relay.

The example shown is for heating only, cooling applications can be done in the same manor using terminals;
X2M 2, 4 & 2, 27.



Relay location:
Hydrobox Control Box 1 or 2
1 - 24 VAC – SPST
NO Contacts, Field supplied

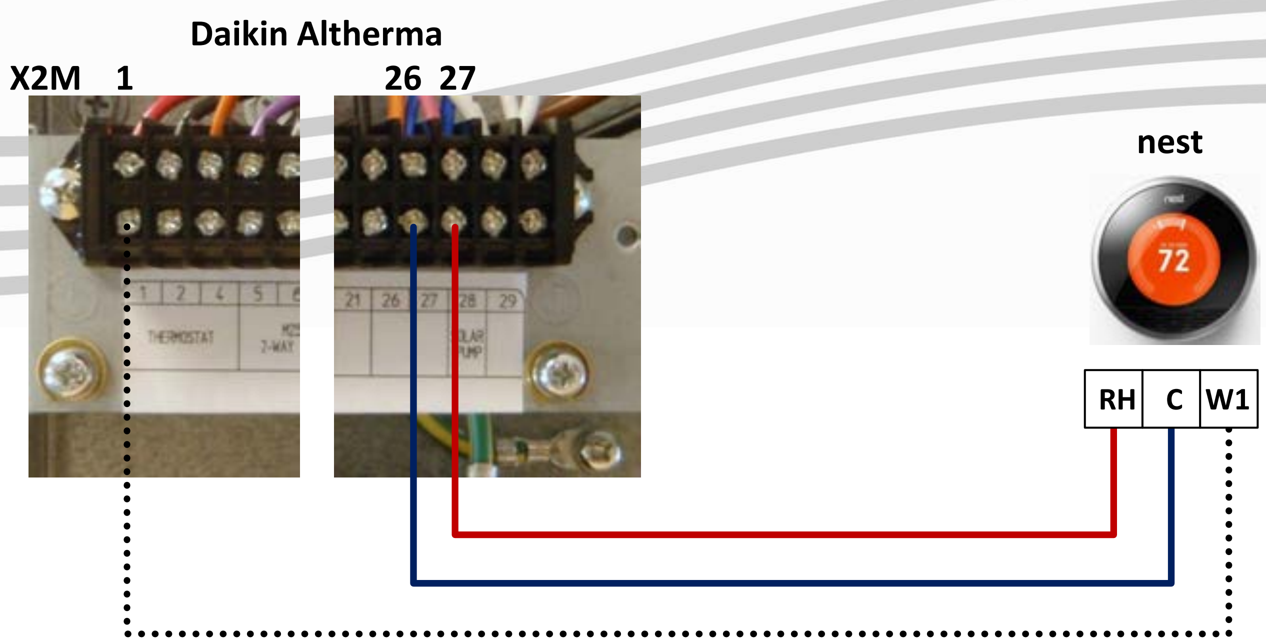
* Electrical work is to comply with ALL local electrical codes

Control Wiring (cont.)

The next few pages show examples of using third party controls with the Daikin Altherma systems. The controls shown can be substituted for equivalent ones. Due to changes and updates made by manufactures it is very important to always consult the installation instructions for the latest wiring and installation guidelines.

Control Wiring (cont.)

1 Radiant/Baseboard Zone Heat Only
24 VAC Powered thermostat

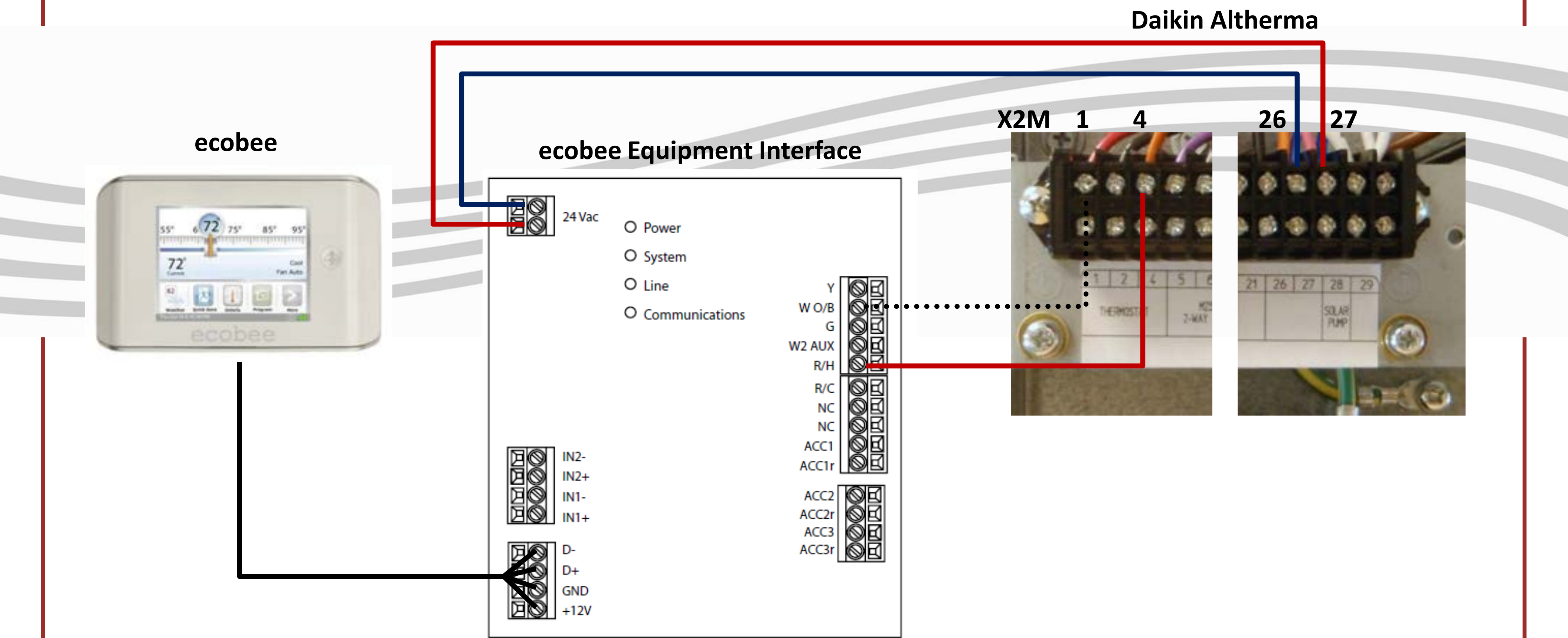


Notes:

1. Common wire needs to be connected

Control Wiring (cont.)

1 Radiant/Baseboard Zone Heat Only



Notes:

1. Program stat to control fan in heat mode

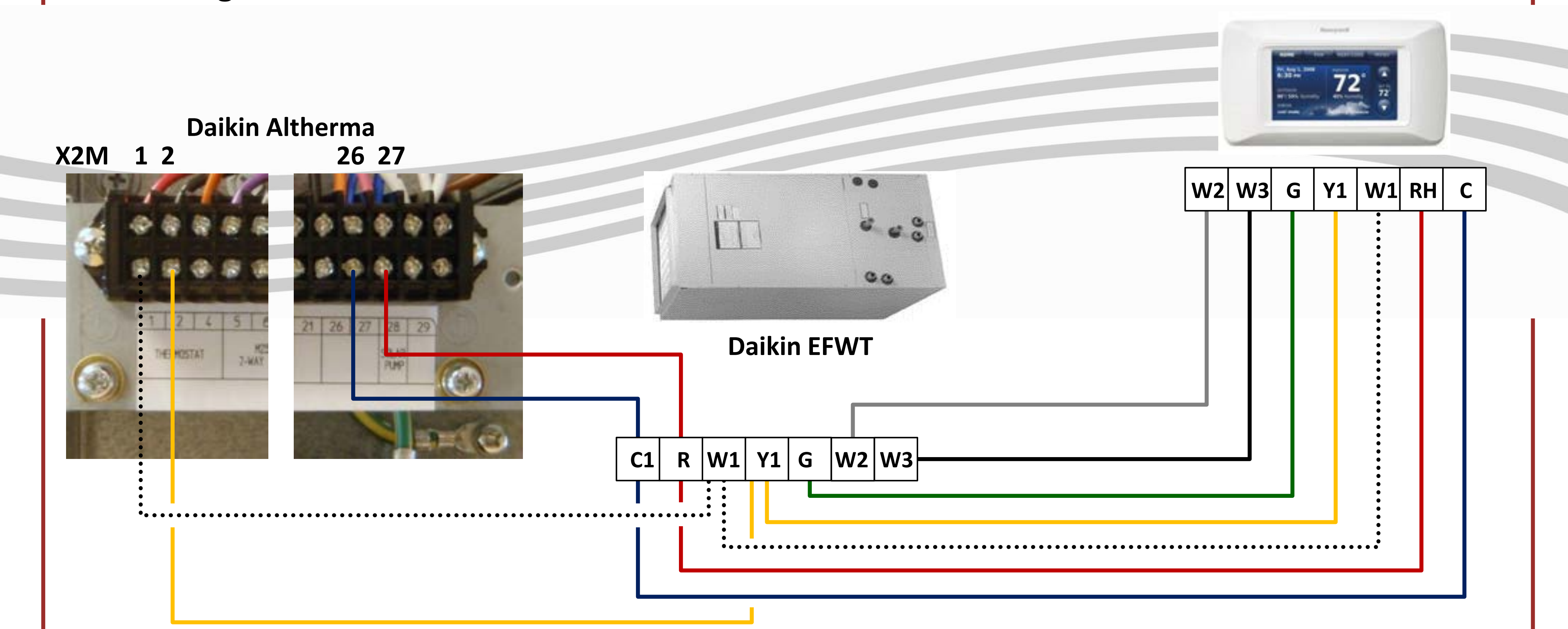
Control Wiring (cont.)

1 Fan Coil Heat/Cool Zone with 1 or 2 Stages of Electric Heat.

Notes:

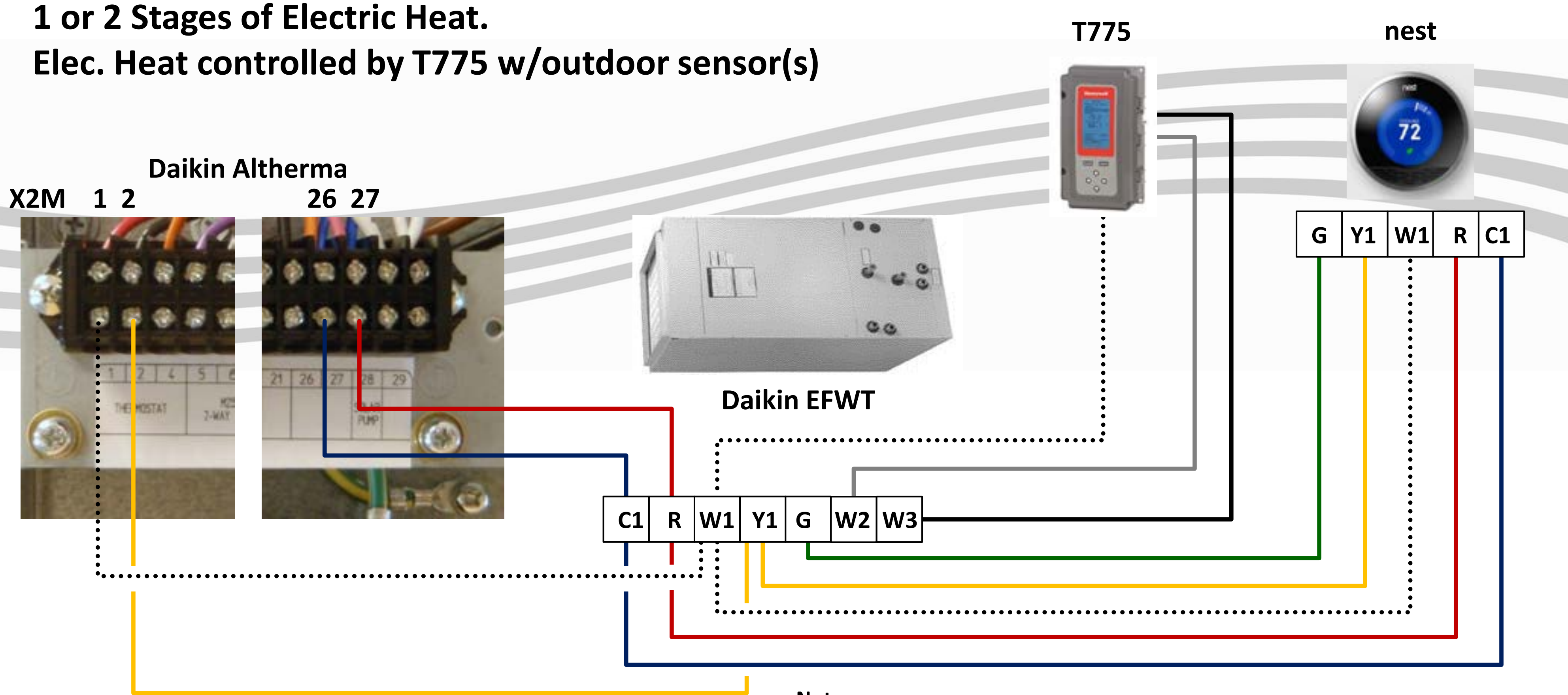
1. Common wire needs to be connected
2. Program stat to control fan in heat & cool modes

Honeywell Prestige



Control Wiring (cont.)

1 Fan Coil Heat/Cool Zone with
1 or 2 Stages of Electric Heat.
Elec. Heat controlled by T775 w/outdoor sensor(s)



Notes:
1. Common wire needs to be connected
2. Program stat to control fan in heat & cool modes
3. T775 can be set to control two ON temps for heat staging

DAIKIN altherma

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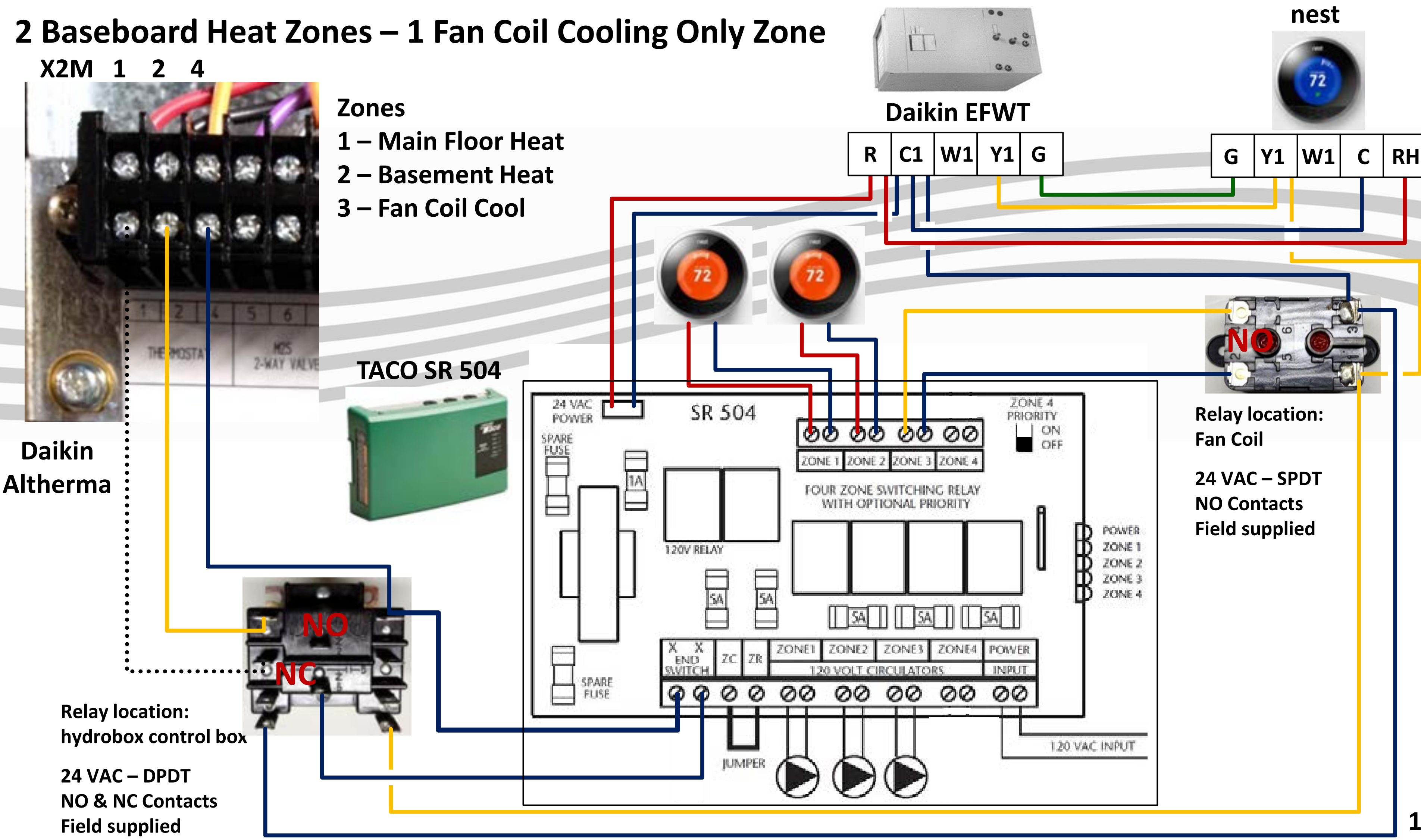
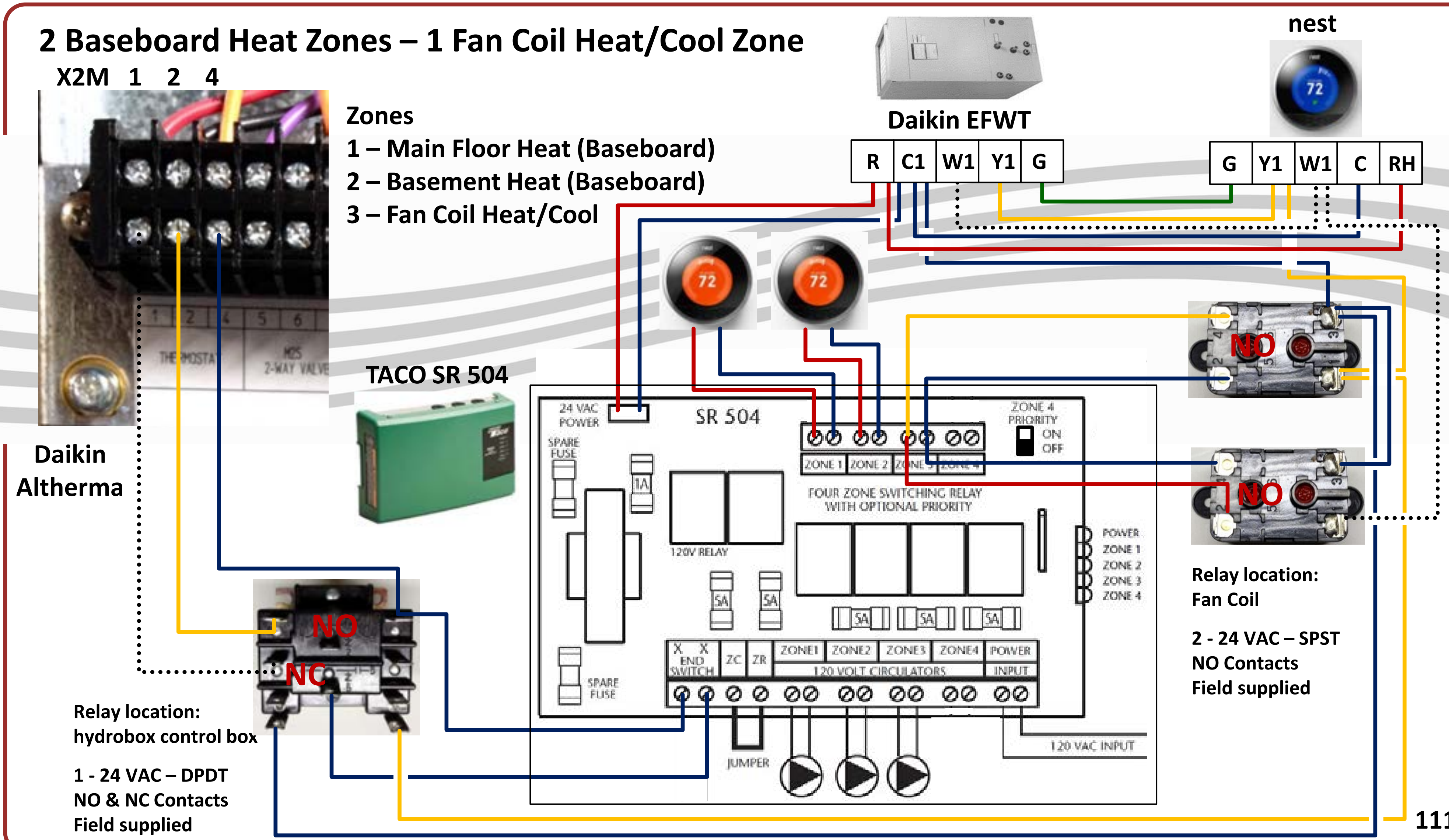
Control Wiring (cont.)

2 Baseboard Heat Zones – 1 Fan Coil Cooling Only Zone



Control Wiring (cont.)

2 Baseboard Heat Zones – 1 Fan Coil Heat/Cool Zone



Zones
1 – Main Floor Heat (Baseboard)
2 – Basement Heat (Baseboard)
3 – Fan Coil Heat/Cool

Relay location:
hydrobox control box

1 - 24 VAC – DPDT
NO & NC Contacts
Field supplied

Relay location:
Fan Coil

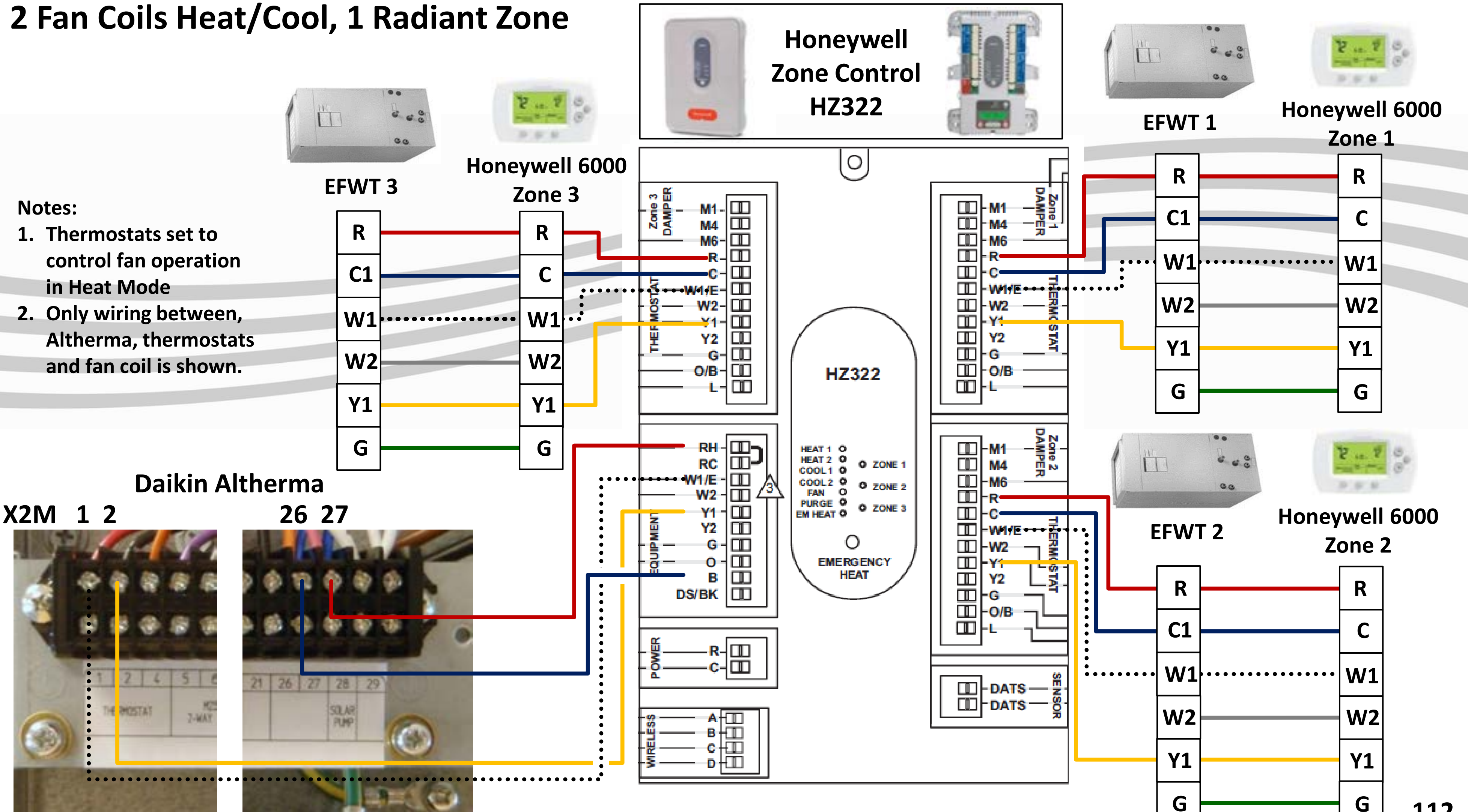
2 - 24 VAC – SPST
NO Contacts
Field supplied

Control Wiring (cont.)

2 Fan Coils Heat/Cool, 1 Radiant Zone

Notes:

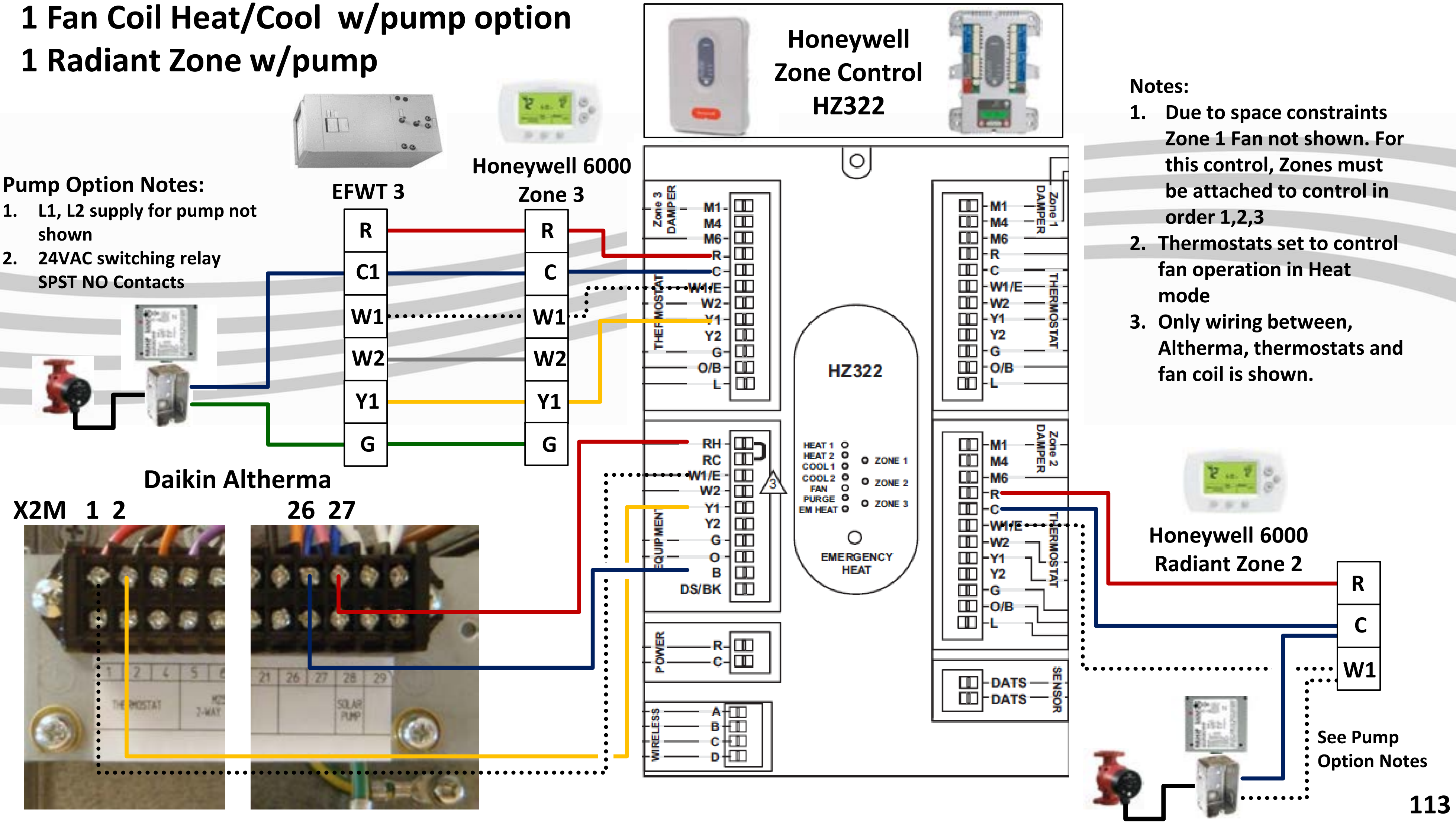
1. Thermostats set to control fan operation in Heat Mode
2. Only wiring between, Altherma, thermostats and fan coil is shown.



Control Wiring (cont.)

1 Fan Coil Heat/Cool w/pump option
1 Radiant Zone w/pump

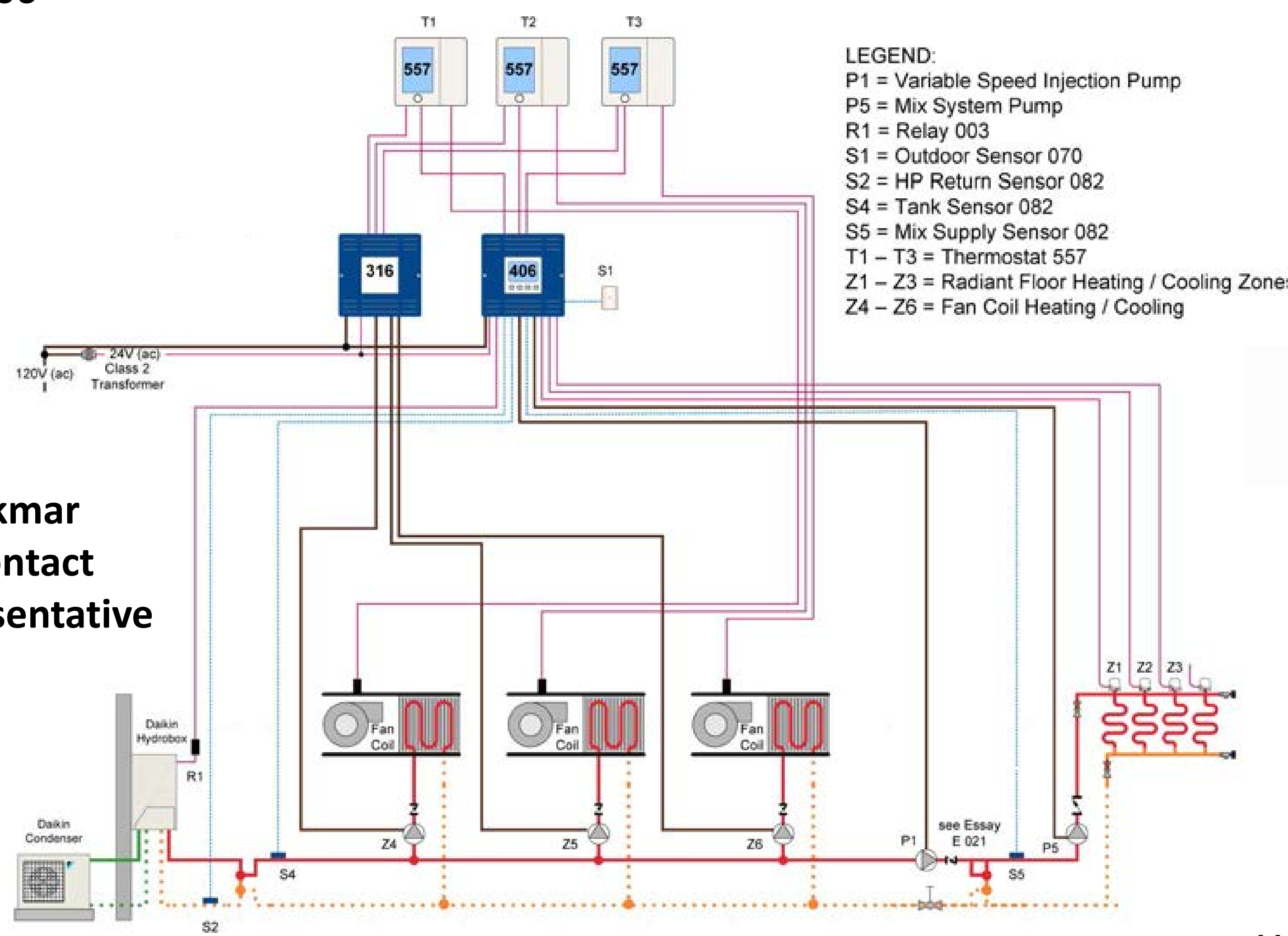
Pump Option Notes:
1. L1, L2 supply for pump not shown
2. 24VAC switching relay SPST NO Contacts



Notes:
1. Due to space constraints Zone 1 Fan not shown. For this control, Zones must be attached to control in order 1,2,3
2. Thermostats set to control fan operation in Heat mode
3. Only wiring between, Altherma, thermostats and fan coil is shown.

Control Wiring (cont.)

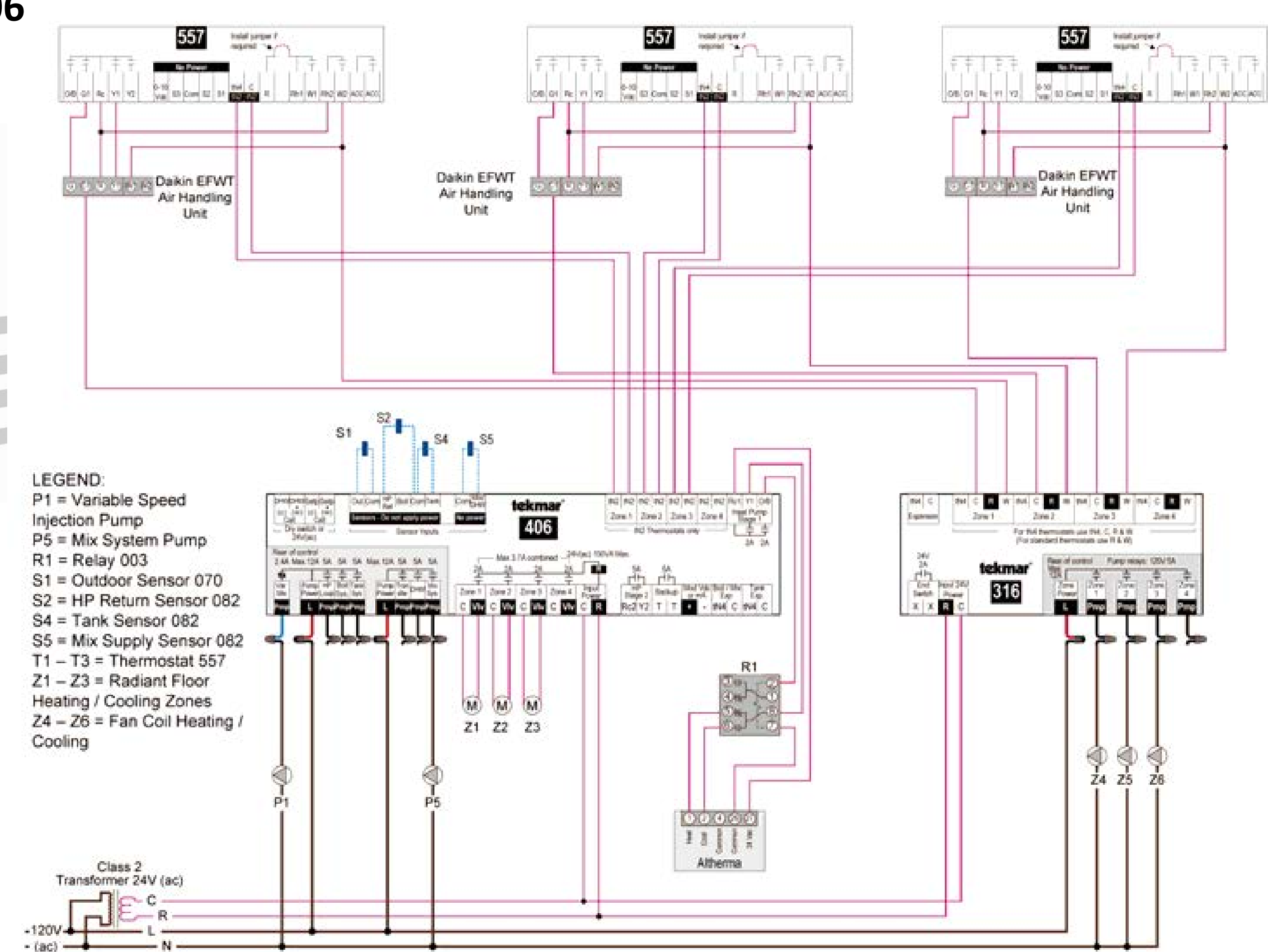
Tekmar House Control 406
Mechanical Drawing



Notes:
Drawing provided by Tekmar
For more information contact your local Tekmar representative

Control Wiring (cont.)

Tekmar House Control 406 Electrical Drawing



Notes:

Drawing provided by Tekmar. For more information contact your local Tekmar representative.

Refrigerant Piping Requirements

Split Systems (ERLQ)

Requirement	Size 018, 024, 030	Size 036, 048, 054
Maximum allowable refrigerant piping length between outdoor unit and indoor unit.	98.4 ft (30 m)	246 ft (75 m)
Minimum required refrigerant piping length between outdoor unit and indoor unit.	10 ft (3 m)	10 ft (3 m)
Maximum allow height difference between outdoor unit and indoor unit.	65.6 ft (20 m)	98.4 ft (30 m)
Refrigerant chargeless length - no additional charge required	≤32.8 ft (≤10 m)	≤98 ft (≤30 m)

Refrigerant Piping Specifications	Indoor Unit	Outdoor Unit
Gas Pipe Connection	5/8 inch (15.9 mm)	5/8 inch (15.9 mm)
Liquid Pipe Connection	1/4 inch (6.35 mm)	1/4 inch (6.35 mm)

Size 018, 024, 030

__Use Only ACR Tubing__

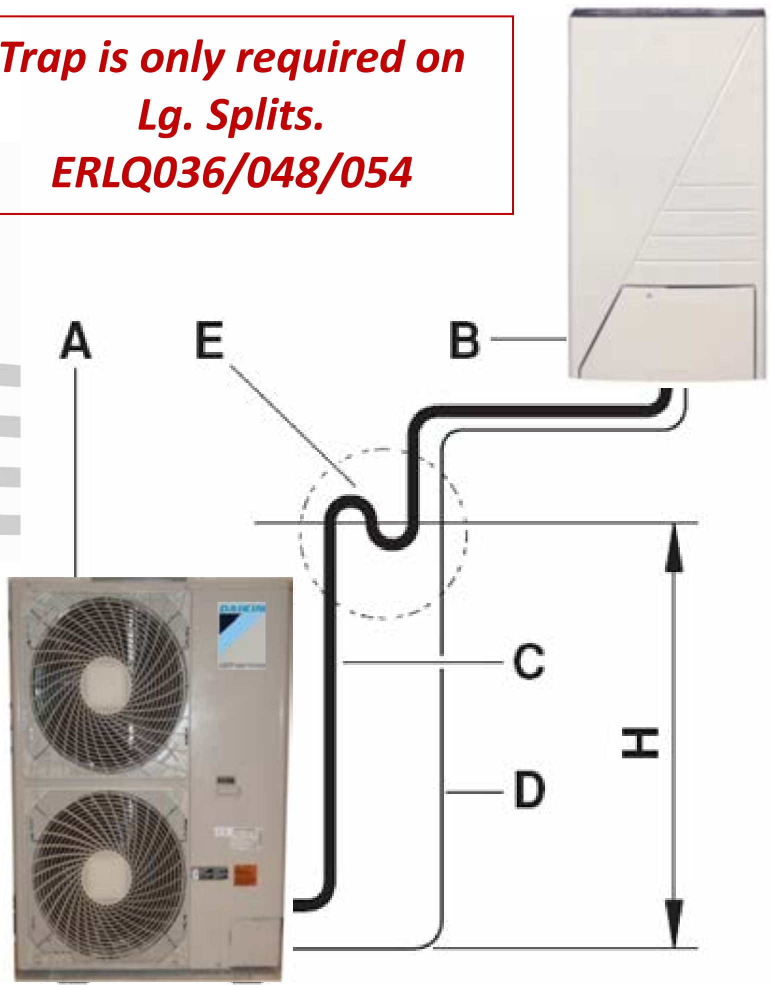
__All Refrigeration Lines Must be Insulated__

Refrigerant Piping Specifications	Indoor Unit	Outdoor Unit
Gas Pipe Connection	5/8 inch (15.9 mm)	5/8 inch (15.9 mm)
Liquid Pipe Connection	3/8 inch (9.5 mm)	3/8 inch (9.5 mm)

Size 036, 048, 054

Refrigerant Piping Requirements (cont.)

Trap is only required on Lg. Splits. ERLQ036/048/054



Cautions for necessity of a trap

Since there is fear of the oil held inside the riser piping flowing back into the compressor when stopped and causing liquid compression phenomenon.

Install trap at each difference in height of 33ft. or 10m is required. Trap can be located with in the 33ft where convenient.

- Trap installation spacing.

A – Outdoor unit
B – Indoor unit
C – Gas piping
D – Liquid piping
E – Oil trap
H – Install trap at each difference in height of 33ft. or 10m.

NOTE: Oil trap is not necessary when the outdoor unit is installed in a higher position than the indoor unit.

Refrigerant Piping Requirements (cont.)

Flare Nut Assembly & Torque Specs

- Dampen a rag with either PVE, POE or WD-40 and wipe flare's face and back side of cone.
- Do not get any lubricant other than PVE in the copper tubing.
- Hand tighten flare and proceed tighten to assigned torque valve.
- Always use a backup wrench when tightening flares.

Flare nut size	Standard tightening torque	
	Ft/lb	N/m
1/4	10.5 – 12.7	14.2 –17.2
3/8	24.2 – 29.4	32.7 – 39.9
5/8	45.6 – 55.6	61.8 – 75.4

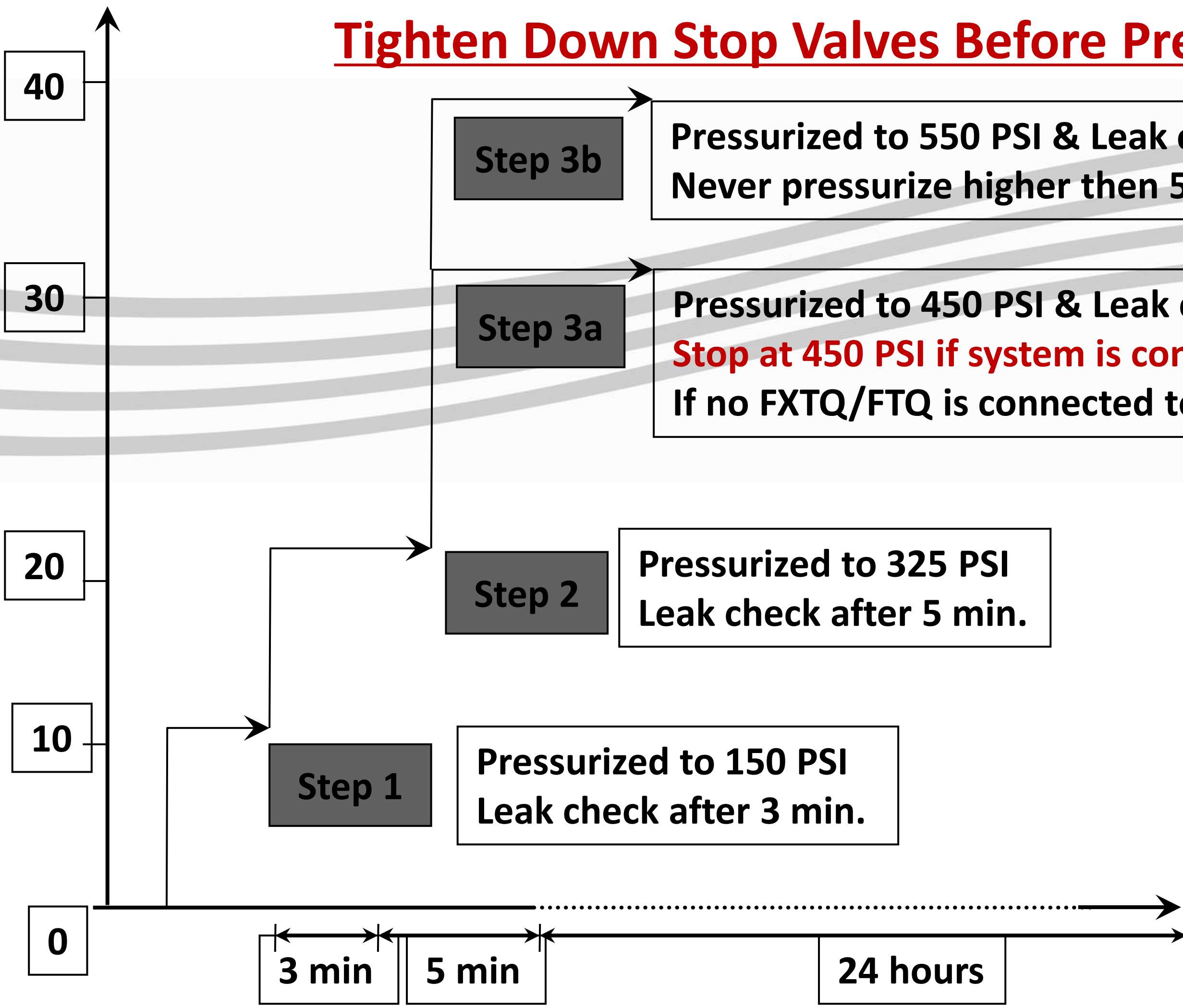
- If no torque wrench is available, the following table can be used
- Once the flare is assembled and hand tight, rotate wrenches the distance from each other using the chart below.

Pipe size (in)	Further tightening angle (degree)	Recommended arm length of tool (in)
1/4"	60 to 90	Approx. 5 7/8"
3/8"	60 to 90	Approx. 7 7/8"
1/2"	30 to 60	Approx. 9 13/16"
5/8"	30 to 60	Approx. 11 13/16"

Refrigerant Piping Requirements (cont.)

Required Pressure Test

Tighten Down Stop Valves Before Pressure Test!!!



If Stop Valves are not tightened down prior to pressure test Nitrogen may leak back through into condenser and contaminate refrigerant.

Refrigerant Piping Requirements (cont.)

Nitrogen Pressure Test Considerations

Nitrogen is subject to expansion and contraction due to ambient temperatures, use this formula to compensate for temperature changes from one day to the next when performing the 24 hour pressure test. The following formula will help do this.

Take the temperature when the system is pressurized (Tp) and subtract the temperature when the pressure is checked (Tc) and multiply by a factor of 0.80 to get the pressure drop (PD).

$$(T_p - T_c) \times 0.80 = PD$$

Refrigerant Piping Requirements (cont.)

Triple Evacuation

- A micron gauge <u>must</u> be used
- Do not energize the indoor units
  - Evacuate the piping to 4,000 microns
  - Break the vacuum with Nitrogen to a level of 2-3 PSIG hold for 20 minutes
  - Evacuate the system to 1,500 microns
  - Break the vacuum with Nitrogen to a level of 2-3 PSIG hold for 20 minutes
  - Evacuate the system to <u>below</u> 500 microns
    - Conduct a rise test; system should hold <u>below</u> 500 microns for 1 hour

NOTE: Vacuum Pump Check Valve should be used to prevent Mineral Oil from being drawn into the system. Schraeder fittings are 5/16”. Use of an adaptor or proper hoses required

Refrigerant Piping Requirements (cont.)

Adding Refrigerant Charge (Split Systems Only)

- During evacuation verify refrigerant line lengths and compare to below chart.
- If no adjustment is necessary open stop valves to release charge in to piping.
- If additional charge is needed use a digital scale to weigh in additional refrigerant charge at the time evacuation is complete.
- Add R-410A as a liquid only, do not charge as a vapor.
- Add If factory charge needs to be removed, follow instructions on next page.

Split Type systems (ERLQ018/24/30)

Requirement	
After charge-less length is exceeded add	.22oz/ft (20g/m)
No adjustment is needed below charge-less length {≤32.8 ft (≤10 m) max 98.4ft.}	

Split Type systems (ERLQ036/48/54)

Requirement
Piping between 9.84 & 16.4 ft, charge must be reclaimed and recharge total charge to 5.95lbs.
Piping between 16.4 and 98.43 ft., no additional refrigerant is needed
Piping between 98.43 ~ 131.23 ft., add 1.1 lbs. of refrigerant
Piping between 131.23 ~ 164.04 ft., add 2.2 lbs. of refrigerant
Piping between 164.04 ~ 196.85 ft., add 3.31 lbs. of refrigerant
Piping between 196.85 ~ 246.06 ft., add 4.41 lbs. of refrigerant

Refrigerant Piping Requirements (cont.)

Removing & Adjusting Refrigerant Charge for ERLQ036/48/54

- If factory charge needs to be removed do not open stop valves yet
- Attached reclaim mach. to port shown
- Reclaim and recharge based on below chart
- Weight charge into evacuated refrigerant pipes through liquid stop valve
- Open stop valves

Attached reclaim machine here

Split Type systems (ERLQ036/48/54)

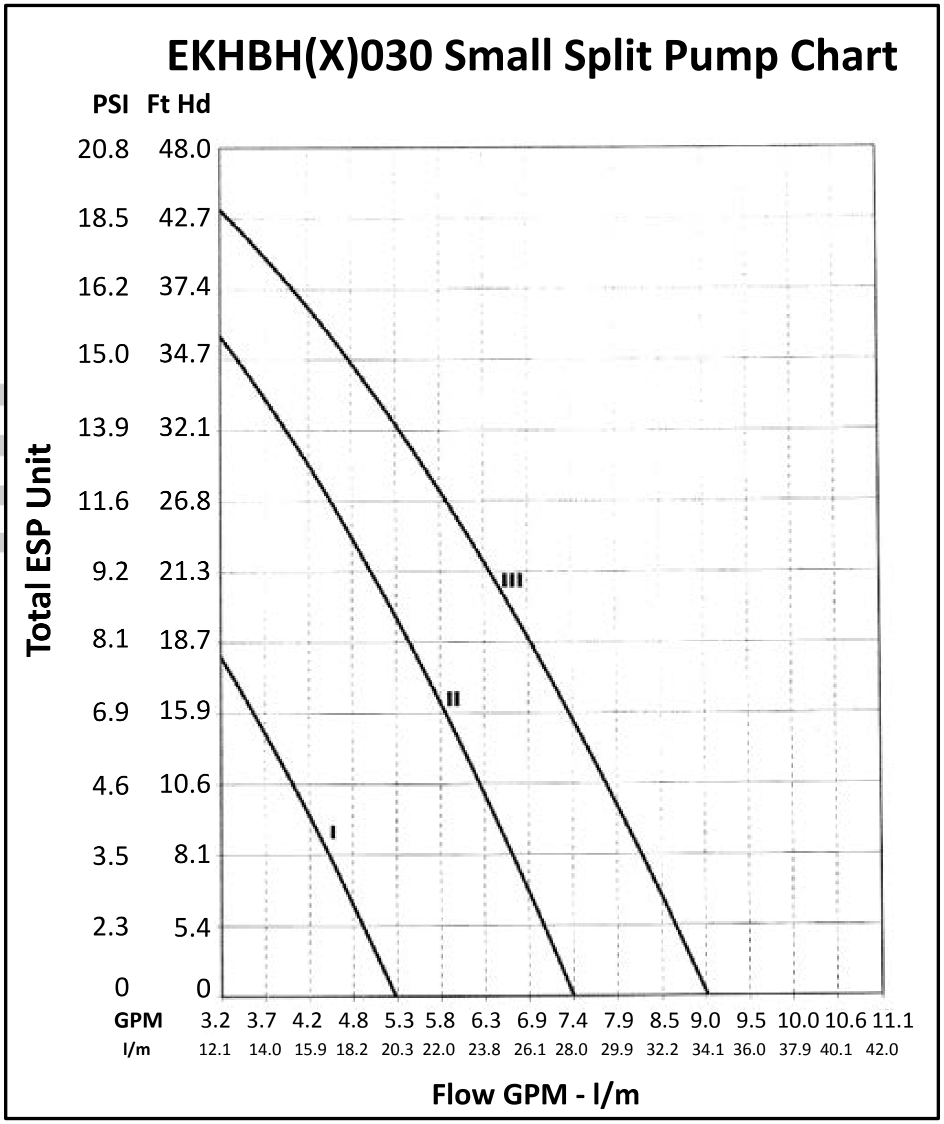
Requirement
Piping between 9.84 & 16.4 ft, charge must be reclaimed and recharge total charge to 5.95lbs.

Pump Charts & Specs – Small Spilt EKHBH(X)030

Altherma	Mode	Unit	EKHBH030 ERLQ 018	EKHBH030 ERLQ 024	EKHBH030 ERLQ 030	EKHBX030 ERLQ 018	EKHBX030 ERLQ 024	EKHBX030 ERLQ 030
Nominal ESP unit	Cooling	Ft. of Hd.	- - -	- - -	- - -	17.1	15.8	15.4
		PSI				7.4	6.85	6.67
	Heating	Ft. of Hd.	16.0	13.8	10.2	16.0	13.8	10.2
		PSI	6.93	5.99	4.42	6.93	5.99	4.42
Water flow rate at Nominal ESP	Cooling (1)	GPM	- - -	- - -	- - -	3.88	4.44	6.40
		l/m				28.7	16.8	17.4
	Heating (2)	GPM	4.36	5.18	6.37	4.36	5.18	6.37
		l/m	16.5	19.6	24.1	16.5	19.6	24.1
Minimum flow	all	GPM	3.17					
		l/m	12.0					
Maximum flow		GPM l/m	- - -					

1. Outside Temp 95°F (35°C) – Leaving water evaporator temp 44.6°F (7°C) (DT = 9°F (5°C)
2. Outside Temp DB/WB 44.6°F/42.8°F (7°C/6°C) – Leaving water condenser temp 95°F (35°C) (DTΔ = 9°F (5°C)

Pump Charts & Specs – Small Spilt EKHBH(X)030 (cont.)



III high speed
II medium speed
I low speed

Total Ft. of Hd. Includes entire Altherma hydronic section

Flow : water flow through unit
PSI x 2.31 = Ft. of Hd.

Warning:

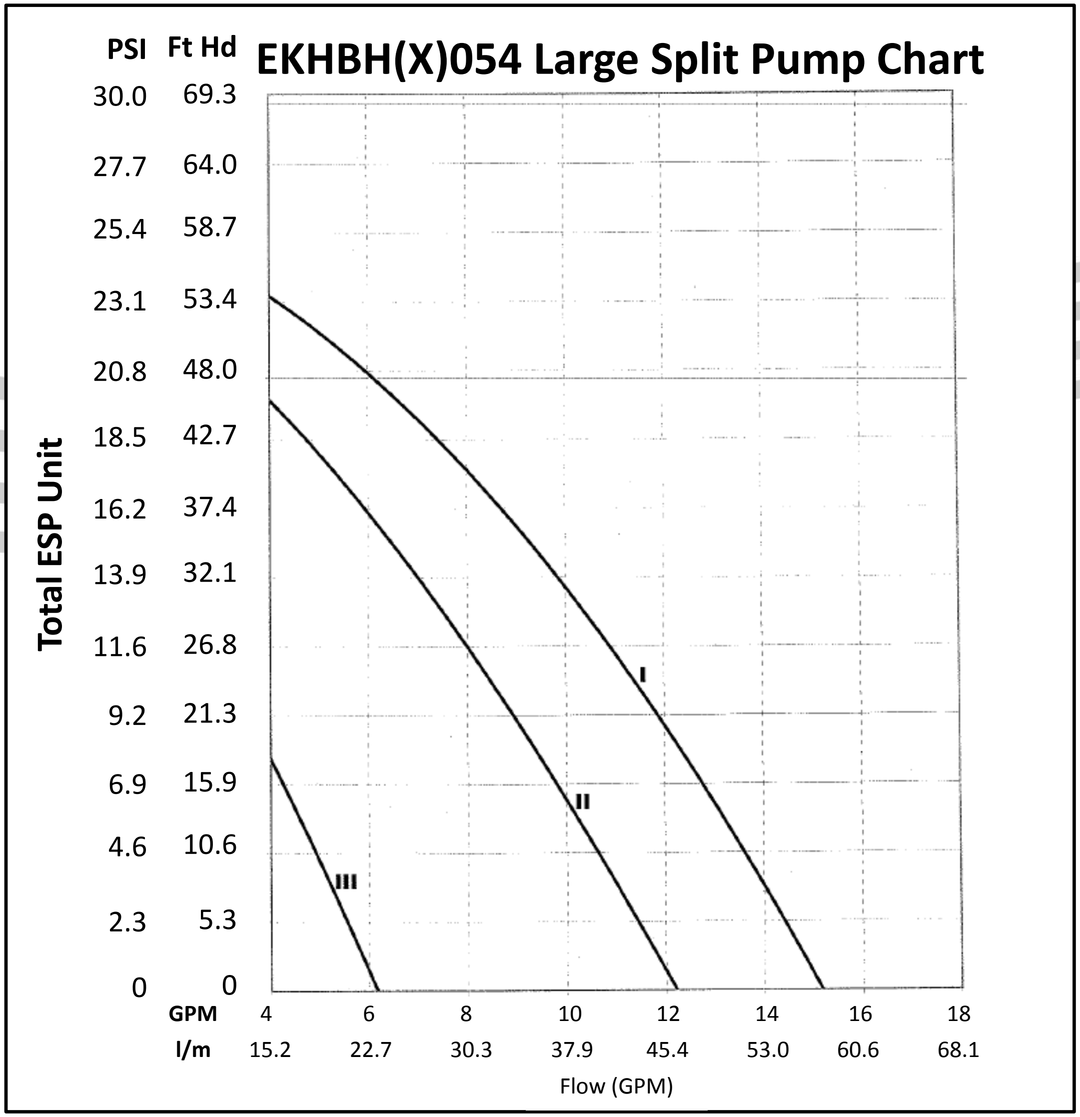
1. Selecting a flow outside the curves can cause damage to of malfunction of the unit. See also the min and max allowed water flow range on previous page.
2. Water quality must be according to “Safe Drinking water Act (42 U.S.C. 300f)”

Pump Charts & Specs – Large Spilt EKHBH(X)054

Altherma	Mode	Unit	EKHBH054 ERLQ 036	EKHBH054 ERLQ 048	EKHBH054 ERLQ 054	EKHBX054 ERLQ 036	EKHBX054 ERLQ 048	EKHBX054 ERLQ 054
Nominal ESP unit	Cooling	Ft. of Hd.	---	---	---	18.6	15.1	14.2
		PSI				8.04	6.53	6.13
	Heating	Ft. of Hd.	17.0	12.7	9.1	17.0	12.7	9.1
		PSI	7.34	5.48	3.92	7.34	5.48	3.92
Water flow rate at Nominal ESP	Cooling (1)	GPM	---	---	---	7.58	9.45	9.90
		l/m				28.7	35.8	37.5
	Heating (2)	GPM	8.47	10.59	12.12	8.47	10.59	12.12
		l/m	32.1	40.1	45.9	32.1	40.1	45.9
Minimum flow	all	GPM	4.23					
		l/m	16.0					
Maximum flow		GPM	15.32					
		l/m	58.0					

1. Outside Temp 95°F (35°C) – Leaving water evaporator temp 44.6°F (7°C) (DT = 9°F (5°C)
2. Outside Temp DB/WB 44.6°F/42.8°F (7°C/6°C) – Leaving water condenser temp 95°F (35°C) (DTΔ = 9°F (5°C)

Pump Charts & Specs – Large Spilt EKHBH(X)054 (cont.)



I high speed **II medium speed** **III low speed**
Total Ft. of Hd. Includes entire Altherma hydronic section
Flow : water flow through unit **PSI x 2.31 = Ft. of Hd.**

Warning:

1. Selecting a flow outside the curves can cause damage to of malfunction of the unit. See also the min and max allowed water flow range on previous page.

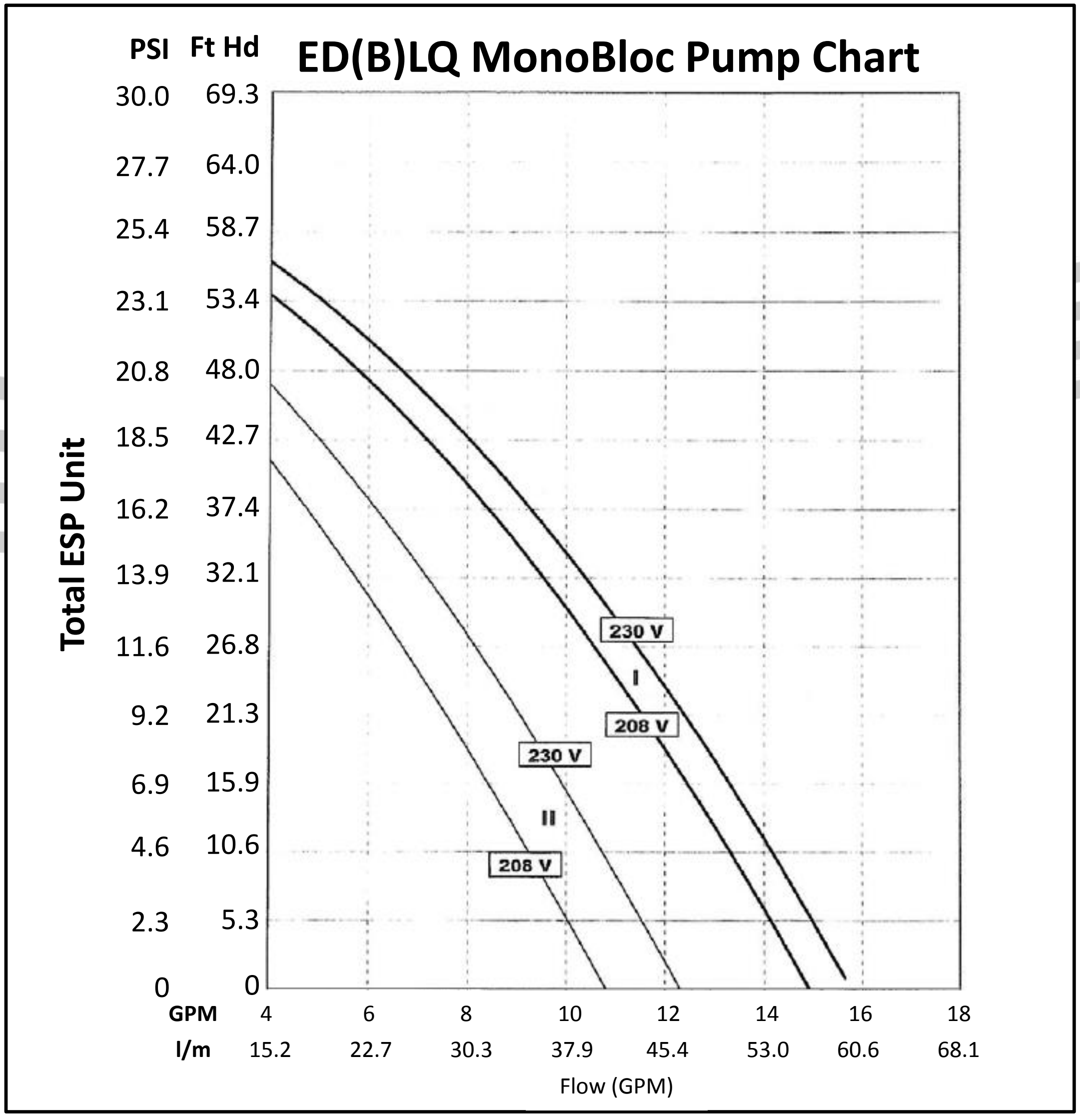
2. Water quality must be according to "Safe Drinking water Act (42 U.S.C. 300f)"

Pump Charts & Specs – MonoBloc ED(B)LQ

Altherma	Mode	Unit	EDLQ 036	EDLQ 048	EDLQ 054	EBLQ 036	EBLQ 048	EBLQ 054
Nominal ESP unit	Cooling	Ft. of Hd.	- - -	- - -	- - -	18.7	16.4	15.7
		PSI				8.1	7.1	6.8
	Heating	Ft. of Hd.	17.6	14.6	11.6	17.6	14.6	11.6
		PSI	7.6	6.3	5.0	7.6	6.3	5.0
Water flow rate at Nominal ESP	Cooling (1)	GPM	- - -	- - -	- - -	9.72	12.13	12.68
		PSI				36.8	45.9	48.0
	Heating (2)	GPM	8.48	10.59	12.13	8.48	10.59	12.13
		l/m	32.1	40.1	45.9	32.1	40.1	45.9
Minimum flow	all	GPM	4.23					
		l/m	16.0					
Maximum flow		GPM	15.32					
		l/m	58.0					

1. Outside Temp 95°F (35°C) – Leaving water evaporator temp 44.6°F (7°C) (DT = 9°F (5°C)
2. Outside Temp DB/WB 44.6°F/42.8°F (7°C/6°C) – Leaving water condenser temp 95°F (35°C) (DTΔ = 9°F (5°C)

Pump Charts & Specs – MonoBloc ED(B)LQ (cont.)



I high speed
II medium speed
III low speed
Speed's II & III are the same

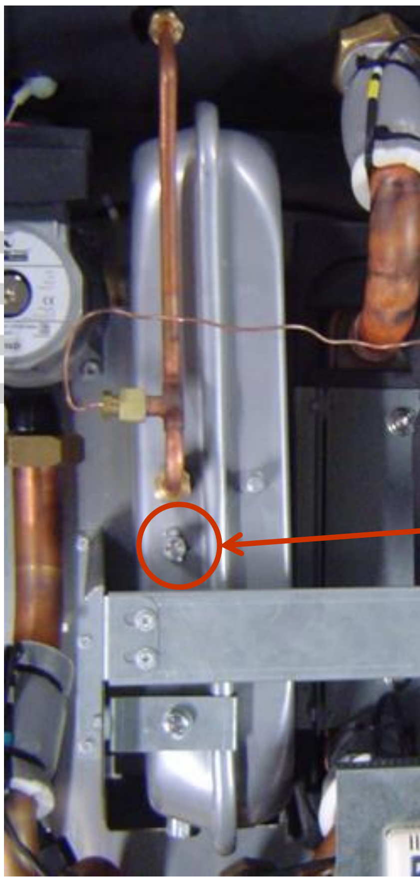
Total Ft. of Hd. Includes entire Altherma hydronic section

Flow : water flow through unit
PSI x 2.31 = Ft. of Hd.

Warning:
1. Selecting a flow outside the curves can cause damage to of malfunction of the unit. See also the min and max allowed water flow range on previous page.
2. Water quality must be according to "Safe Drinking water Act (42 U.S.C. 300f)"

Setting Expansion Vessel

Expansion vessel needs to be set based on application



Hydrobox

- Factory pre-pressure for the expansion vessel is 14.5 PSI (1 bar), keep in mind the following guidelines:
  - Use dry nitrogen to set the expansion vessel pre-pressure
  - Inappropriate setting of the expansion vessel pre-pressure can lead to malfunction of the system
  - Charging point to adjust the pressure inside the expansion vessel.
- Water volume expansion vessel: 2.642 gal / 10 liter
- Follow the installation instructions on how to adjust pressure of tank if the application requires adjustment.

MonoBloc

Setting Expansion Vessel (cont.)

How to set internal expansion tank

- Measure each size pipe and use correct chart to find distribution systems internal volume.
- Fan coil units, radiant zones and any other emitters should be included in calculations.
- Internal volume of Altherma equipment should also be included

Altherma Equipment Internal Volume	
Hydrobox	1.45 gal
MonoBloc	1.45 gal
DHW Tank	1.8 gal
EFWT Fan Coil	- - -

Type M Copper Internal Volume	
¾"	37' = 1 gal (0.0269 gal per ft)
1"	22' = 1 gal (0.0454 gal per ft)
1 ¼"	15' = 1 gal (0.0681 per ft)
1 ½"	11' = 1 gal (0.0951 per ft)
2"	6' = 1 gal (0.165 per ft)

Setting Expansion Vessel (cont.)

How to set internal expansion tank (cont.)

- Using the table to the right determine if any action will be needed.
- If the pressure needs to be adjusted
- The pre-pressure (Pg) to be set depends on the maximum installation height difference (H) and is calculated as below:
  Pg (PSI)=(H÷32+0.3) X 14.5

Example 1:
Install is 16.4' of height separation and the volume is 26.4 gal.
No action required

Installation height difference[a]	Water volume	
	≤74 gallons (280 l)	>74 gallons (280 l)
≤23 ft (≤7 m)	No pre-pressure adjustment required.	Actions required: • pre-pressure must be decreased, calculate according to "Calculating the pre-pressure of the expansion vessel" • check if the water volume is lower than maximum allowed water volume (use graph below)
>23 ft (>7 m)	Actions required: • pre-pressure must be increased, calculate according to "Calculating the pre-pressure of the expansion vessel" • check if the water volume is lower than maximum allowed water volume (use graph below)	Expansion vessel of the unit too small for the installation.

(a) Installation height difference: height difference (ft)(m) between the highest point of the water circuit and the unit. If the unit is located at the highest point of the installation, the installation height is considered 0 ft (0 m).

Setting Expansion Vessel (cont.)

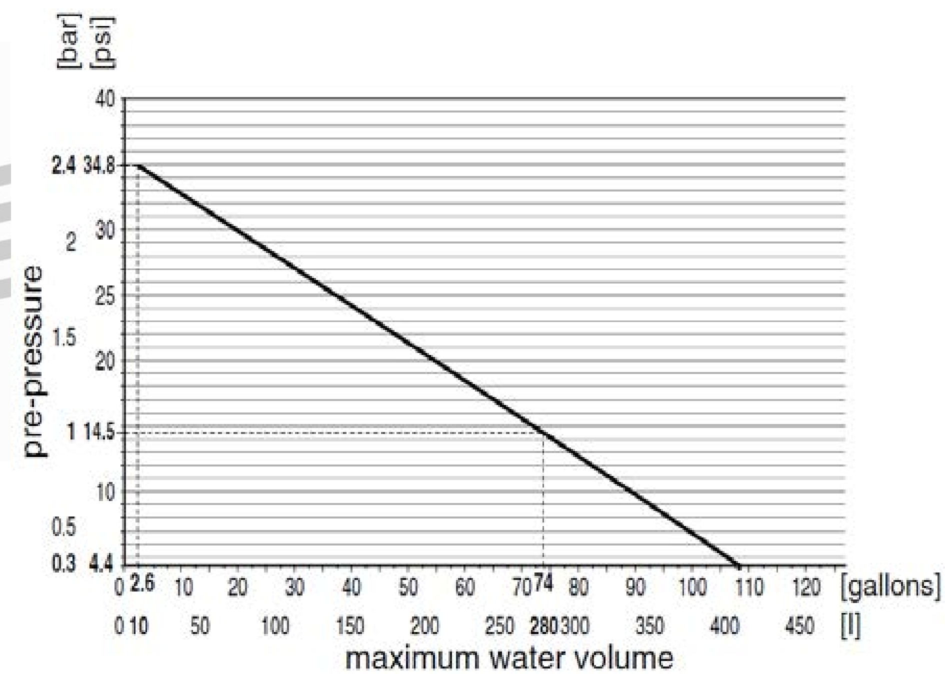
How to set internal expansion tank (cont.)

Determine water volume of system

Example 2:
Hydronic section installed at highest point in water circuit. The total water volume is 92.5 gal. Height = 0.

(0÷32+0.3) x 14.5 = 4.4 PSI

4.4 PSI will allow for 108 gal of water, on board tank will suffice adjust tank to 4.4 PSI.



Hydronic Fan Coil Unit

Consult the fan coils Installation Guide for more detailed electrical specifications

120 ECM

Units	Power supply				Fan motor (ECM)	
Model	VAC	Hz	MOP	MCA	HP	FLA
EFWT018AEVLU EFWT024AEVLU	120	60	15	6	1/3	4.8
EFWT030AEVLU EFWT036AEVLU				10	1/2	7.3
EFWT048AEVLU				14	3/4	10.5
EFWT060AEVLU				15	1	11.5

EFWT Fan Coils
Up-flow, Horizontal Left
& Right

208/240 ECM

Units	Power supply				Fan motor (ECM)	
Model	VAC	Hz	MOP	MCA	HP	FLA
EFWT018AEVJU EFWT024AEVJU	208/ 240	60	15	6	1/3	1.9
EFWT030AEVJU EFWT036AEVJU				10	1/2	2.8
EFWT048AEVJU				14	3/4	4.7
EFWT060AEVJU				15	1	7.1

120 PSC

Units	Power supply				Fan motor (PSC)	
Model	VAC	Hz	MOP	MCA	HP	FLA
EFWT018APVLU EFWT024APVLU	120	60	15	3.75	1/5	3.0
EFWT030APVLU EFWT036APVLU				7.5	1/3	6.0
EFWT048APVLU				10	1/2	8.0
EFWT060APVLU				13.12	3/4	10.5

Hydronic Fan Coil Unit (cont.)

These tables show the electrical characteristics for fan coils with the factory installed electric heat package option.

Only EFWT0**AEJU 208/240VAC can be ordered with Factory Installed Electric Heat.

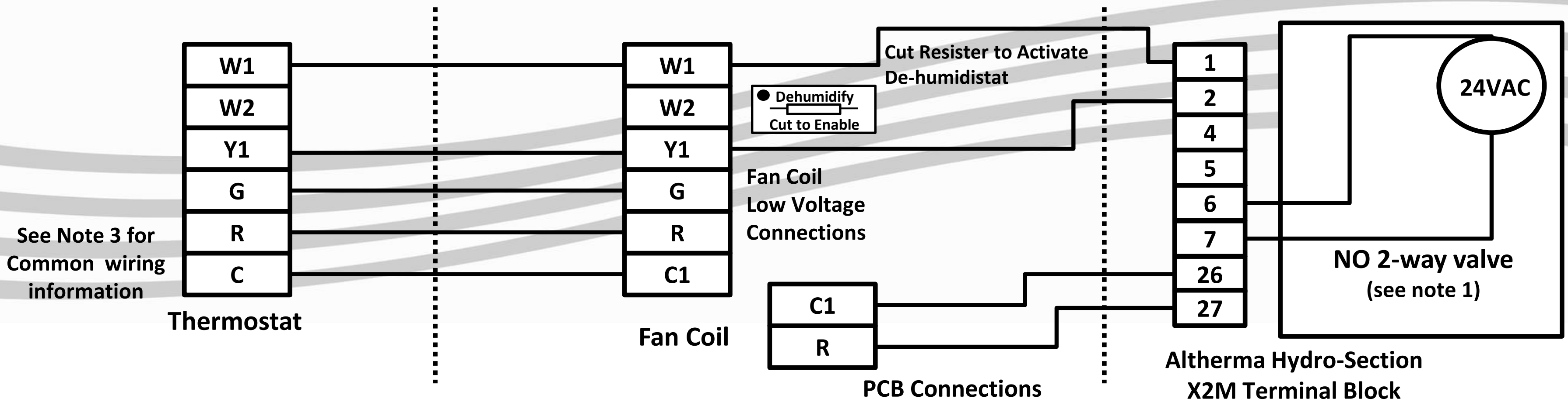
Model	kW	Circuits	FLA 208/240	MCA 208/240	MOP 208/240
EFWT018AEVJU EFWT024AEVJU	0kW	0	2.0(240)	- - -	15/15
	5kW	1	20/23	25/28	25/30
	10kW	1	38/44	47/54	50/60
EFWT030AEVJU EFWT036AEVJU	0kW	0	2.5(240)	- - -	15/15
	10kW	1	39/45	49/56	50/60
	15kW	1	39/45	49/56	50/60
		2	18/21	23/26	25/30

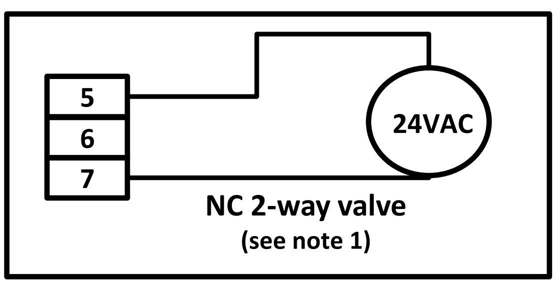
Model	kW	Circuits	FLA 208/240	MCA 208/240	MOP 208/240
EFWT048AEVJU	0kW	0	3.5(240)	- - -	15/15
	15kW	1	42/48	53/60	50/60
		2	18/21	23/27	25/30
	20kW	1	40/46	50/57	50/60
		2	36/42	46/53	50/60
	25kW	1	40/46	50/57	50/60
		2	36/42	46/53	50/60
		3	18/21	23/27	25/30
EFWT060AEVJU	0kW	0	5.0(240)	- - -	15/15
	15kW	1	42/48	53/60	50/60
		2	18/21	23/27	25/30
	20kW	1	42/48	53/60	50/60
		2	36/42	46/53	50/60
	25kW	1	42/48	53/60	50/60
		2	36/42	46/53	50/60
		3	1821	23/27	25/30

Hydronic Fan Coil Unit – Control Wiring Example

For all ECM Fan Coil Unit Models – No Electric Heat

1 Stage Heating Altherma / 1 Stage Cooling / No Electric Heat





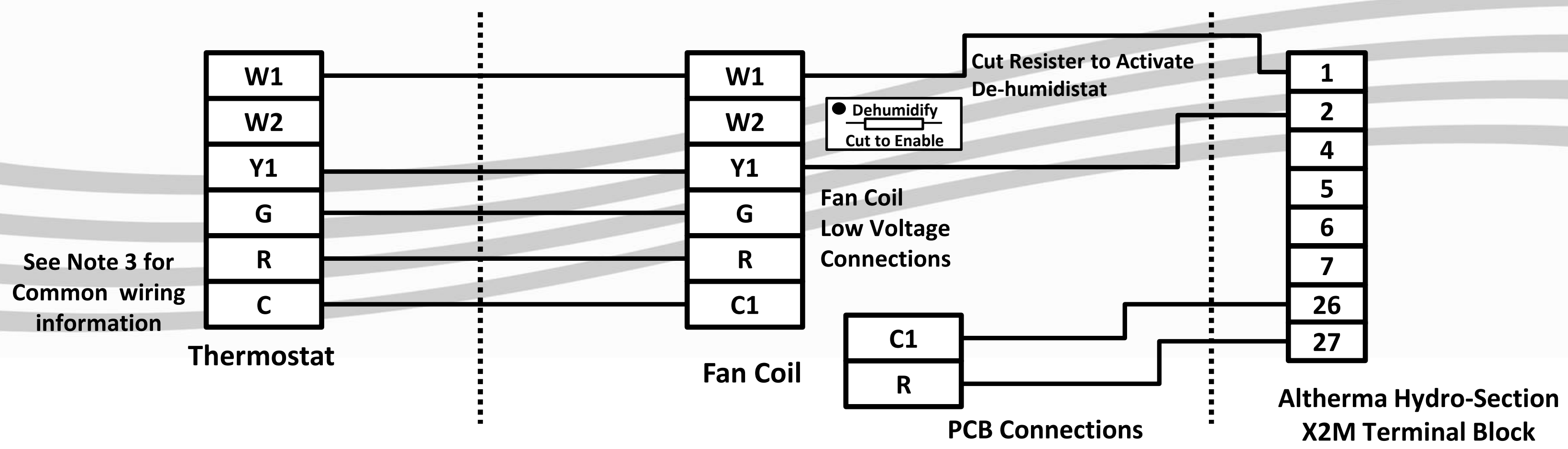
Notes:
1. 2-way valve is only needed when individual heating circuits need separation. (i.e. under floor heating to fan coil only cooling) 24 VAC 100 mA max.
2. Make sure to set Heating/Cooling fan speeds (see fan setting table)
3. Common wire to thermostat only required if thermostat needs common wire.

Refer to installation instructions for further examples and details

Hydronic Fan Coil Unit – Control Wiring Example (cont.)

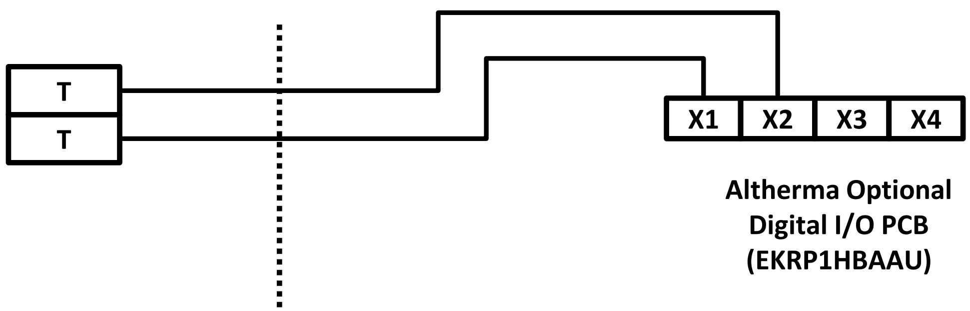
For all ECM Fan Coil Unit Models in Bi-valent Applications

1 Stage Heating Altherma with Bi-valent (boiler of other)



Notes:

1. 2-way valve is only needed when individual heating circuits need separation. (i.e. under floor heating to fan coil only cooling) 24 VAC 100 mA max.
2. Make sure to set Heating/Cooling fan speeds (see fan setting table)
3. Common wire to thermostat only required if thermostat needs common wire.

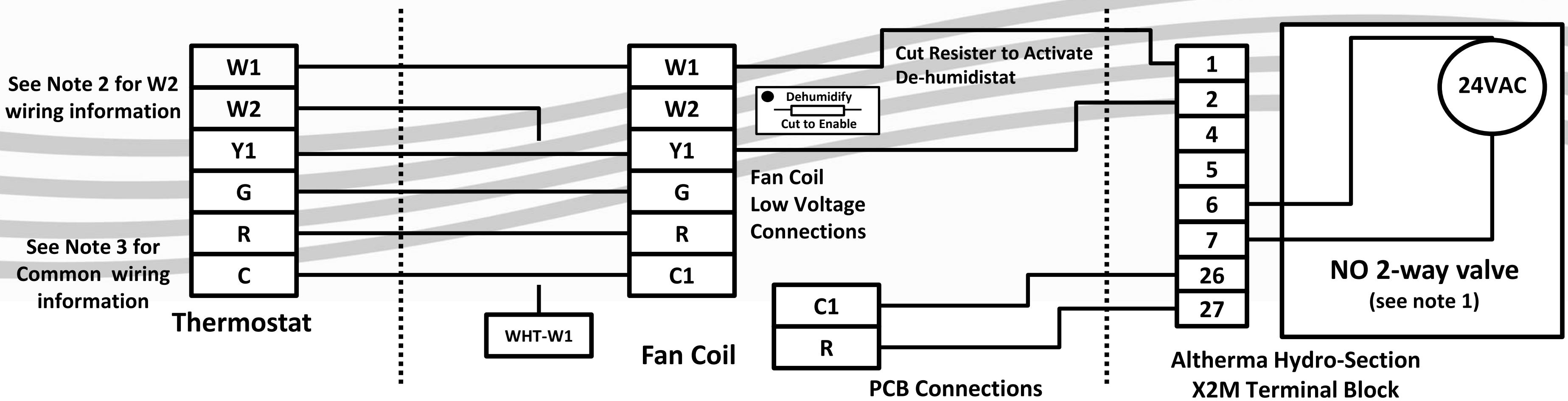


Refer to installation instructions for further examples and details

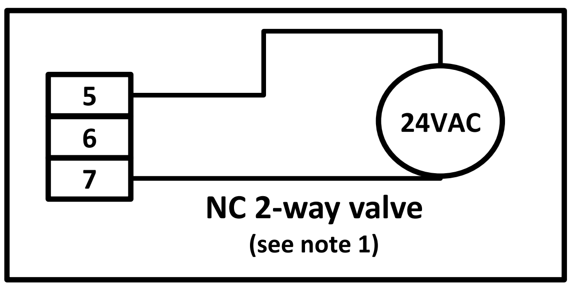
Hydronic Fan Coil Unit – Control Wiring Example (cont.)

For all ECM Fan Coil Unit Models

2 Stage Heating Altherma with 5 or 10kW Electric Heat / 1 Stage Cooling



Notes:
1. 2-way valve is only needed when individual heating circuits need separation. (i.e. under floor heating to fan coil only cooling) 24 VAC 100 mA max.
2. Electric Heat – 5 & 10kW has 1 heat circuit/1 stage
   A. WHT-W1 Electric Heat wire in fan coil control box (W2 stage 2)
   B. Make sure to set Heating/Cooling fan speeds
3. Common wire to thermostat only required if thermostat needs common wire.

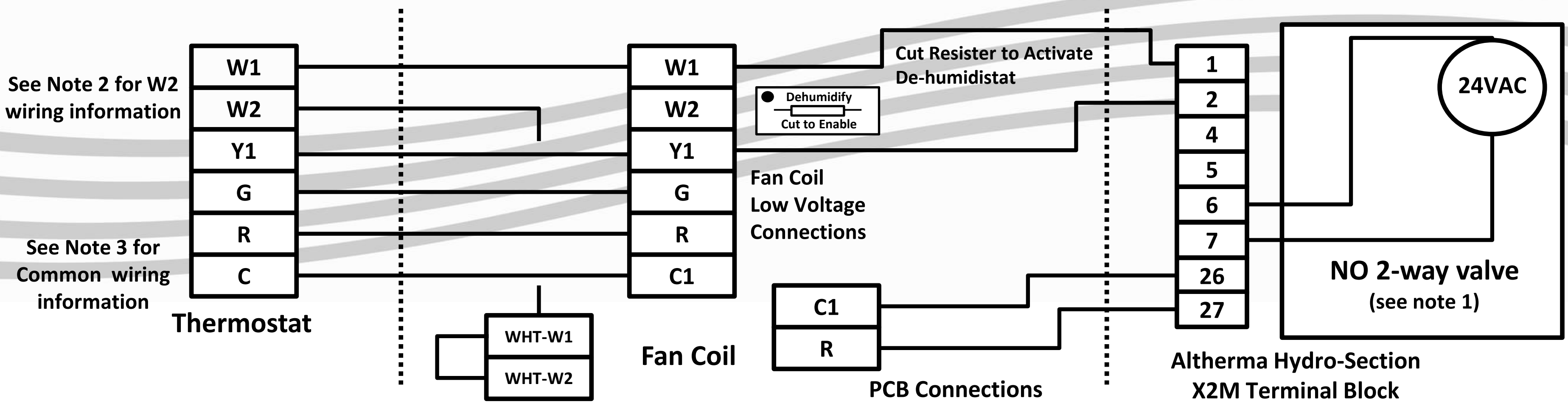


Refer to installation instructions for further examples and details

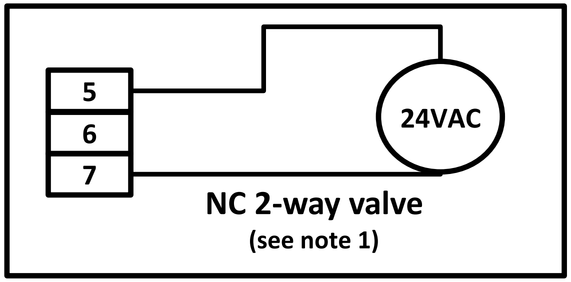
Hydronic Fan Coil Unit – Control Wiring Example (cont.)

For all ECM Fan Coil Unit Models

2 Stage Heating Altherma with 15 or 20kW Electric Heat / 1 Stage Cooling



Notes:
1. 2-way valve is only needed when individual heating circuits need separation. (i.e. under floor heating to fan coil only cooling) 24 VAC 100 mA max.
2. Electric Heat – 5 & 10kW has 1 heat circuit/1 stage
    A. WHT-W1 Electric Heat wire in fan coil control box (W2 stage 2)
    B. Make sure to set Heating/Cooling fan speeds
3. Common wire to thermostat only required if thermostat needs common wire.

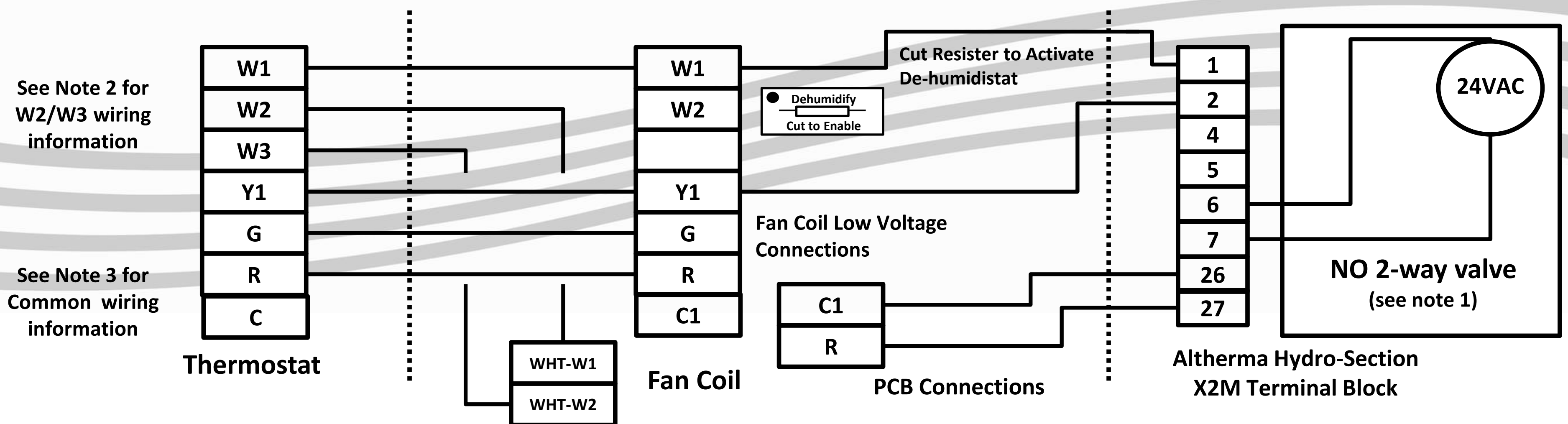


Refer to installation instructions for further examples and details

Hydronic Fan Coil Unit – Control Wiring Example (cont.)

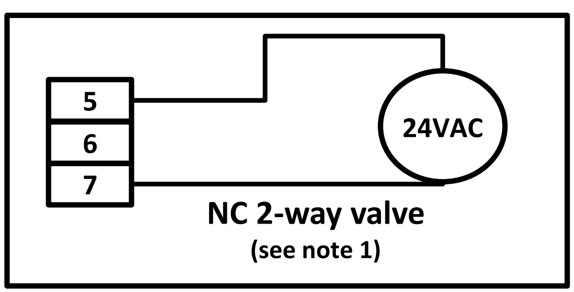
For all ECM Fan Coil Unit Models

3 Stage Heating Altherma with 15 or 20kW Electric Heat / 1 Stage Cooling



Notes:

1. 2-way valve is only needed when individual heating circuits need separation. (i.e. under floor heating to fan coil only cooling) 24 VAC 100 mA max.
2. Electric Heat – 15kW & 20kW have 2 heat circuits/2 stages
   - A. WHT-W1 – Electric Heat wire in fan coil control box (W2 stage 2)
   - B. WHT-W2 – Electric Heat wire in fan coil control box (W3 stage 3)
   - C. Make sure to set Heating/Cooling fan speeds
3. Common wire to thermostat only required if thermostat needs common wire.

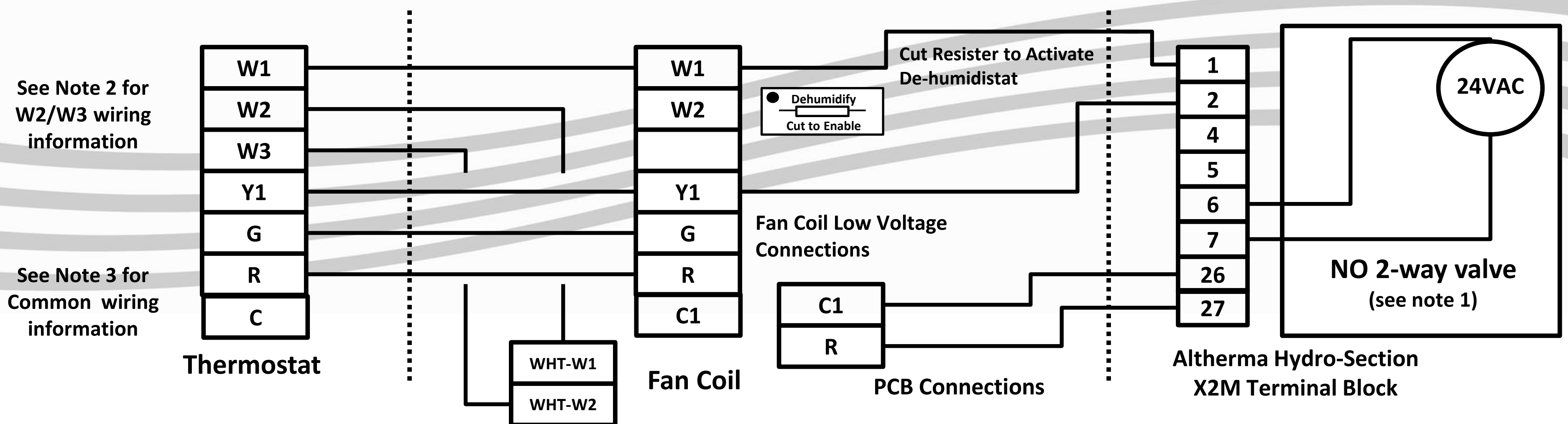


Refer to installation instructions for further examples and details

Hydronic Fan Coil Unit – Control Wiring Example (cont.)

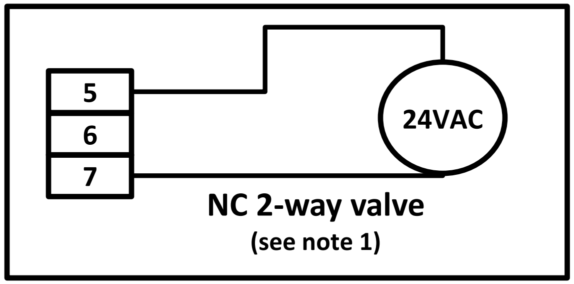
For all ECM Fan Coil Unit Models

3 Stage Heating Altherma with 25kW Electric Heat / 1 Stage Cooling



Notes:

1. 2-way valve is only needed when individual heating circuits need separation. (i.e. under floor heating to fan coil only cooling) 24 VAC 100 mA max.
2. Electric Heat – 15kW & 20kW have 2 heat circuits/2 stages
   - A. WHT-W1 – Electric Heat wire in fan coil control box (W2 stage 2)
   - B. WHT-W2 – Electric Heat wire in fan coil control box (W3 stage 3)
   - C. Make sure to set Heating/Cooling fan speeds
3. Common wire to thermostat only required if thermostat needs common wire.

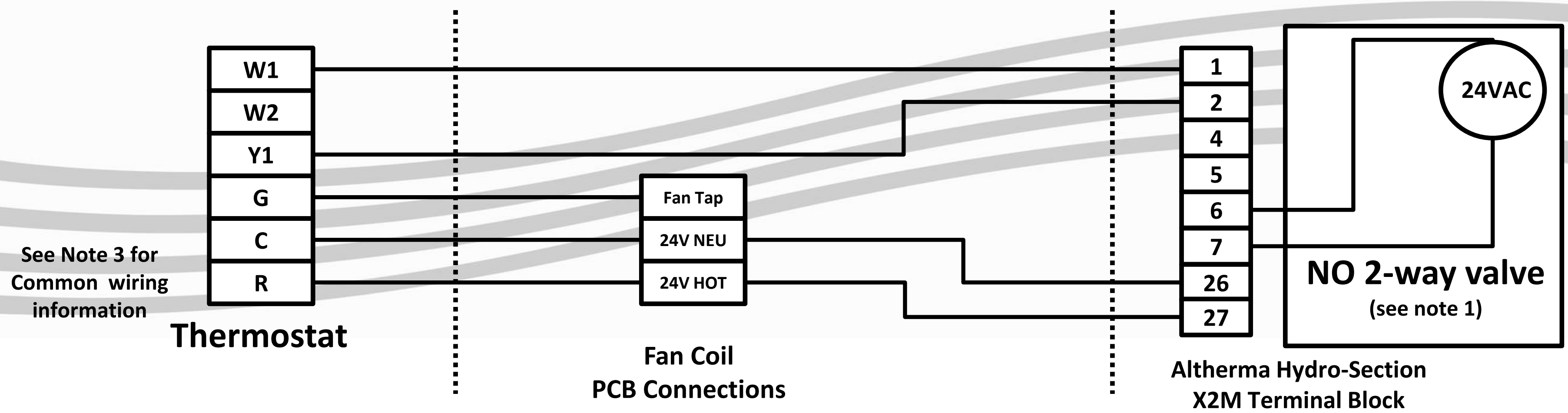


Refer to installation instructions for further examples and details

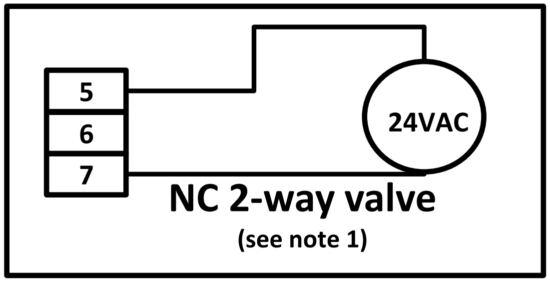
Hydronic Fan Coil Unit – Control Wiring Example (cont.)

For all 120 VAC PSC Fan Coil Unit Models – No Electric Heat

1 Stage Heating Altherma / 1 Stage Cooling / No Electric Heat



Notes:
1. 2-way valve is only needed when individual heating circuits need separation. (i.e. under floor heating to fan coil only cooling) 24 VAC 100 mA max.
2. Make sure to set fan speed (motor tap) (see fan setting table)
3. Remove 2 red jumpers from fan coil PCB for 24 volt control circuit
4. Common wire to thermostat only required if thermostat needs common wire.



Refer to installation instructions for further examples and details

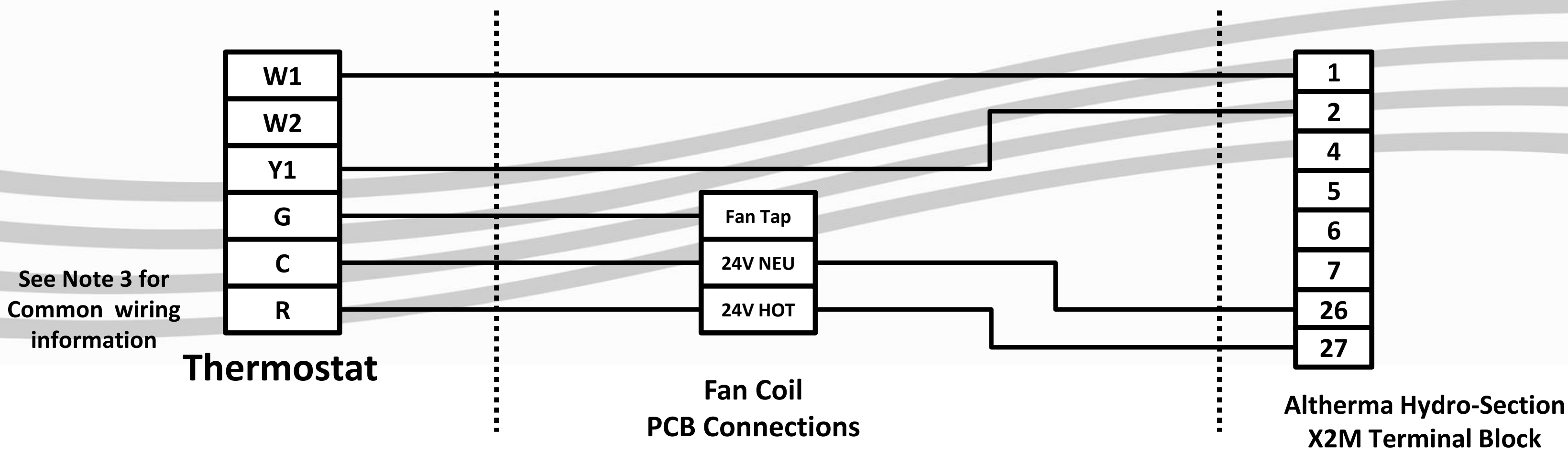
DAIKIN altherma

R-410A INVERTER

Hydronic Fan Coil Unit – Control Wiring Example (cont.)

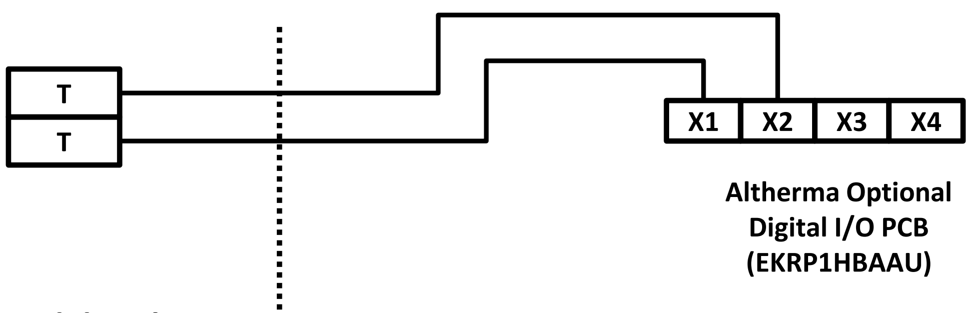
For all PSC Fan Coil Unit Models in Bi-valent Applications

1 Stage Heating Altherma with Bi-valent (boiler of other)



Notes:

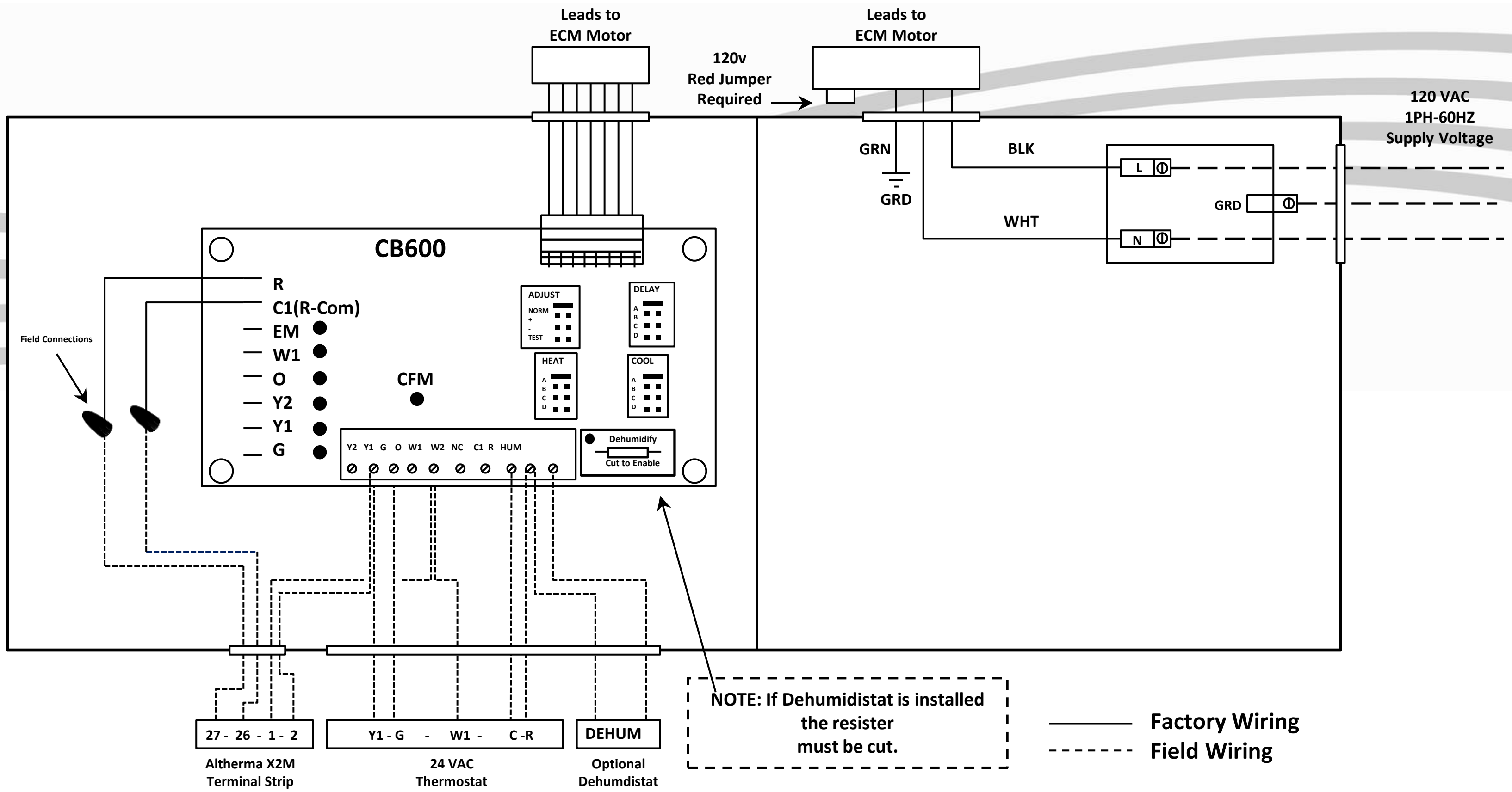
1. 2-way valve is only needed when individual heating circuits need separation. (i.e. under floor heating to fan coil only cooling) 24 VAC 100 mA max.
2. Make sure to set fan speed (motor tap) (see fan setting table)
3. Remove 2 red jumpers from fan coil PCB for 24 volt control circuit
4. Common wire to thermostat only required if thermostat needs common wire.



Refer to installation instructions for further examples and details

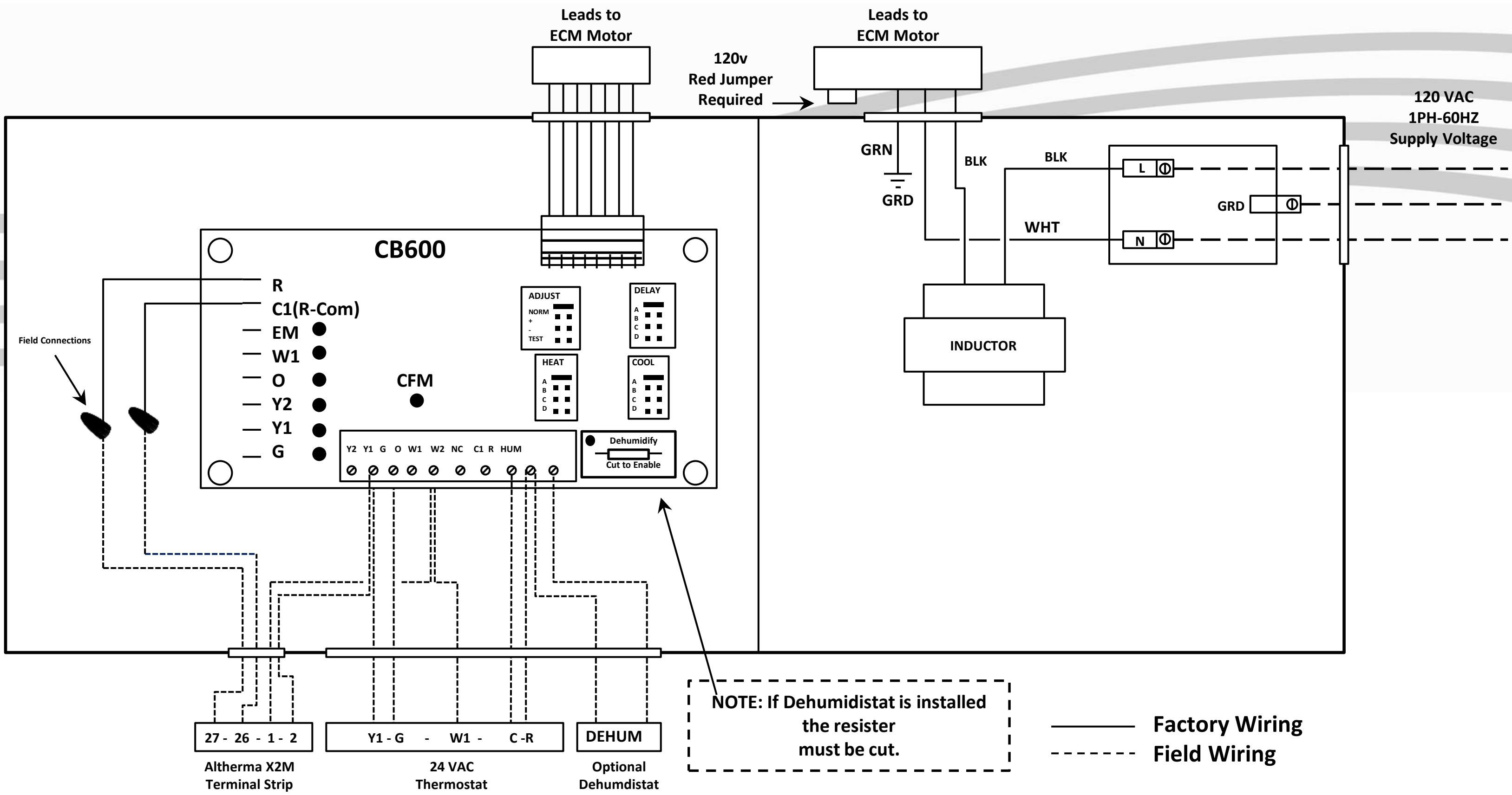
Hydronic Fan Coil Unit – Internal Wiring Example

EFWT018~036AEVLU Fan Coil (120V-ECM) / Altherma



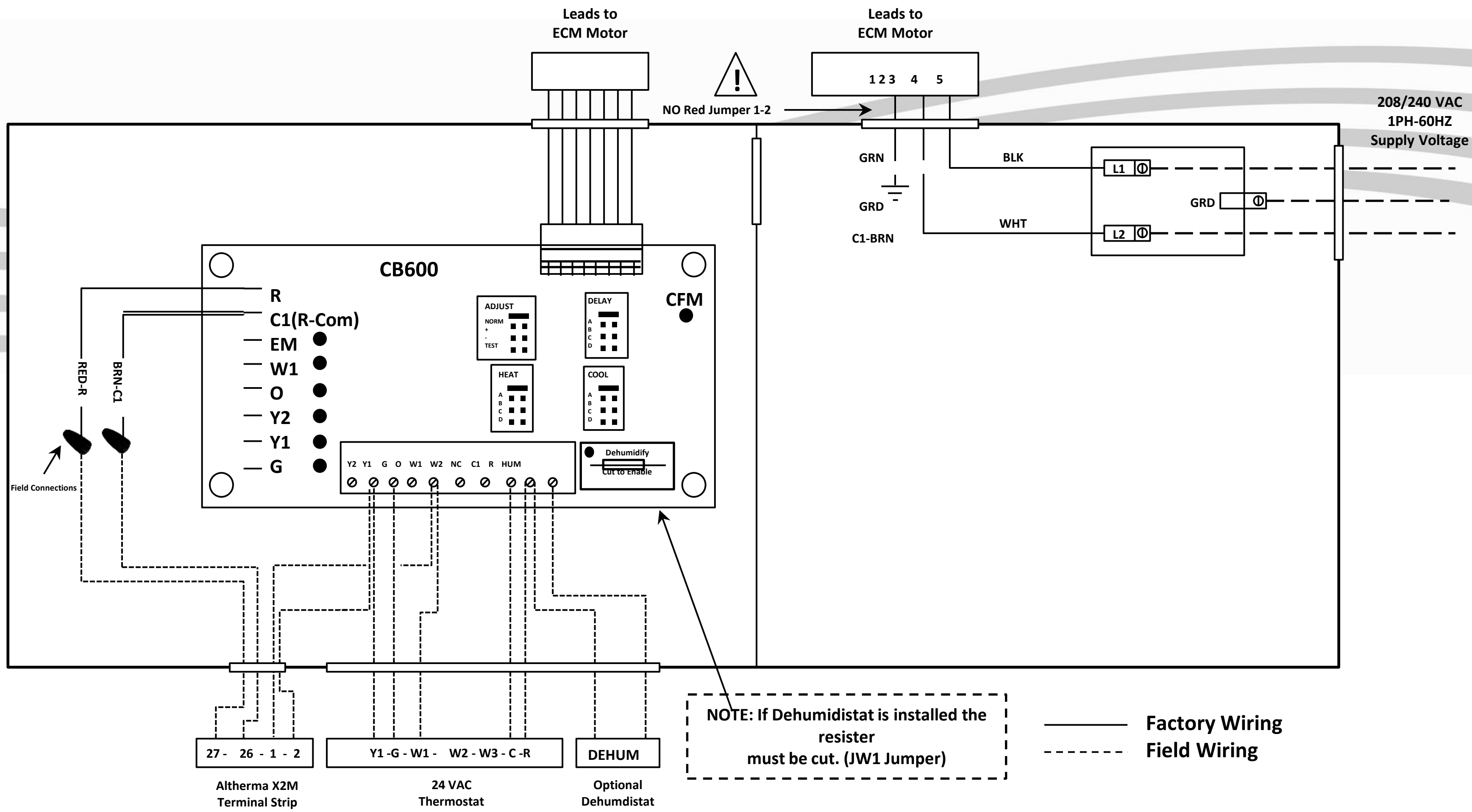
Hydronic Fan Coil Unit – Internal Wiring Example (cont.)

EFWT048~060AEVLU Fan Coil (120V-ECM) / Altherma



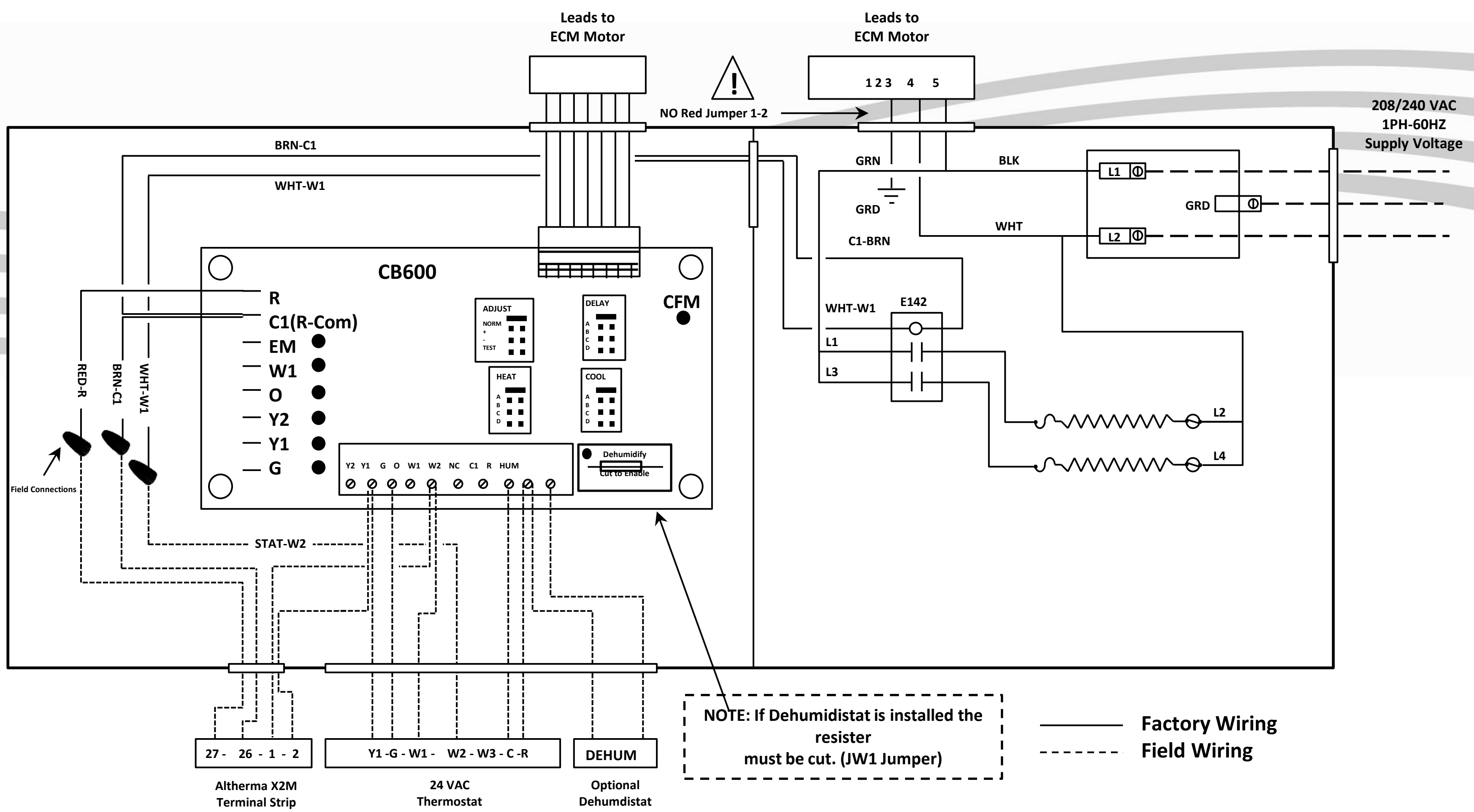
Hydronic Fan Coil Unit – Internal Wiring Example (cont.)

EFWT_AEVJU-00 Fan Coil (208/240V-ECM-No Electric Heat) / Altherma



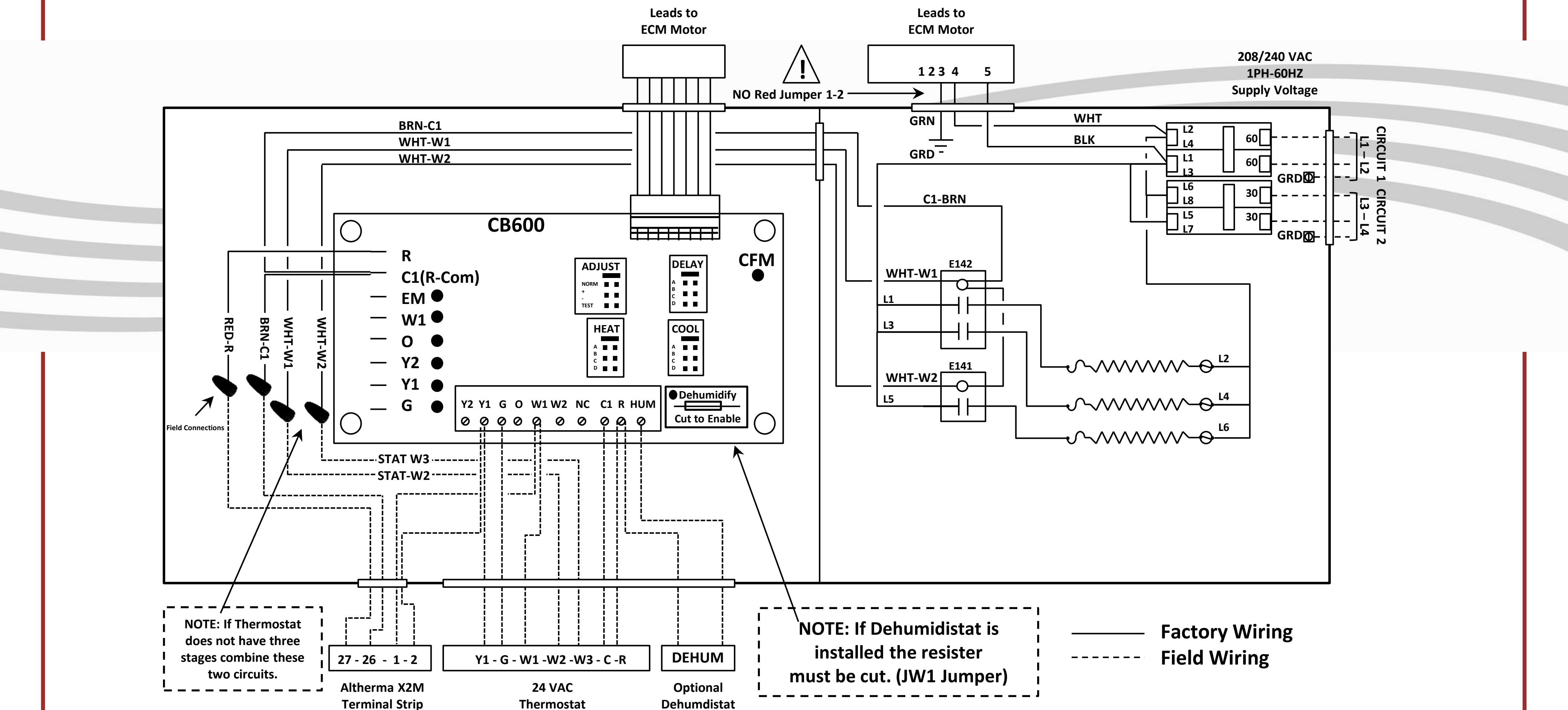
Hydronic Fan Coil Unit – Internal Wiring Example (cont.)

EFWT_AEVJU-05 Fan Coil (208/240V-ECM-05kW Electric Heat) / Altherma
EFWT_AEVJU-10 Fan Coil (208/240V-ECM-10kW Electric Heat) / Altherma



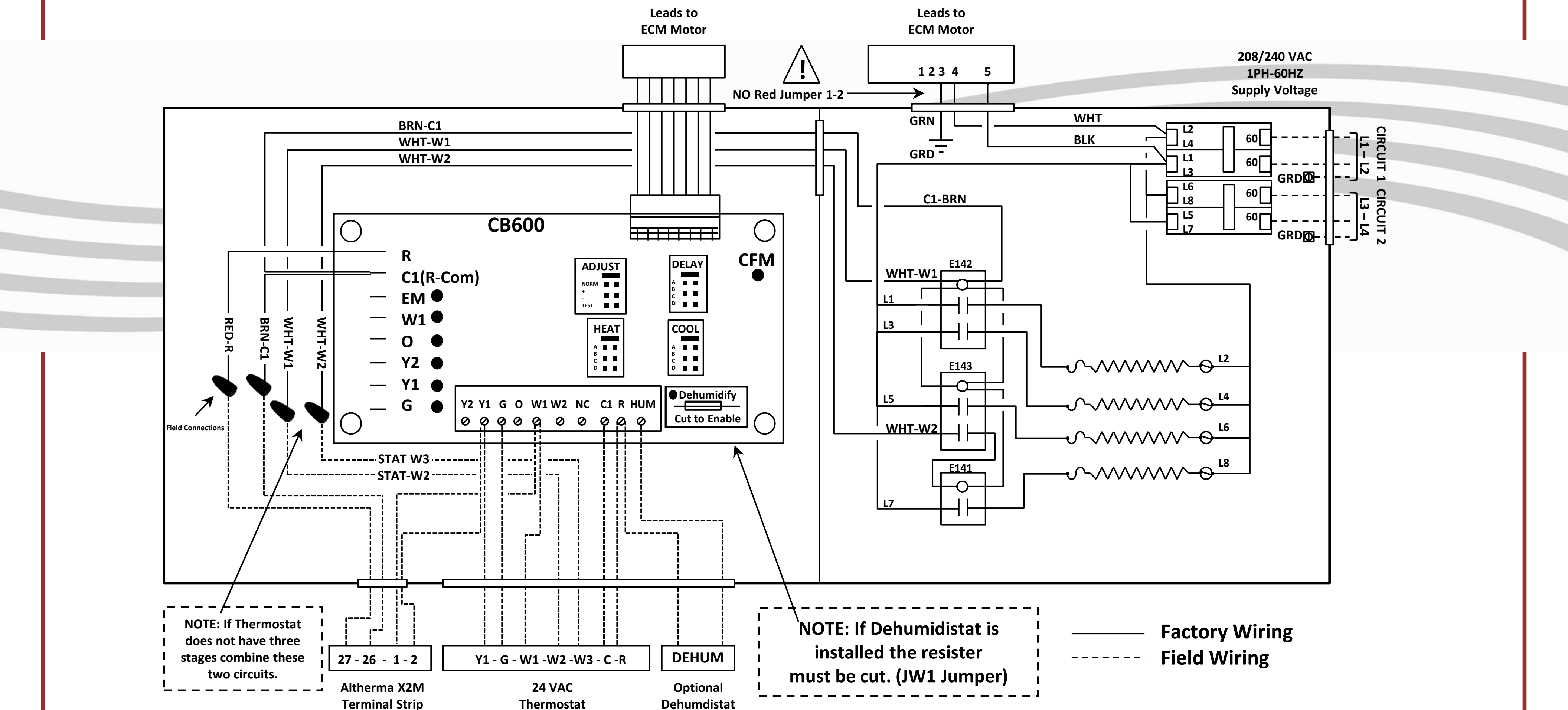
Hydronic Fan Coil Unit – Internal Wiring Example (cont.)

EFWT_AEVJU-15 Fan Coil (208/240V-ECM-15kW Electric Heat) / Altherma



Hydronic Fan Coil Unit – Internal Wiring Example (cont.)

EFWT_AEVJU-20 Fan Coil (208/240V-ECM-20kW Electric Heat) / Altherma



NOTE: If Thermostat does not have three stages combine these two circuits.

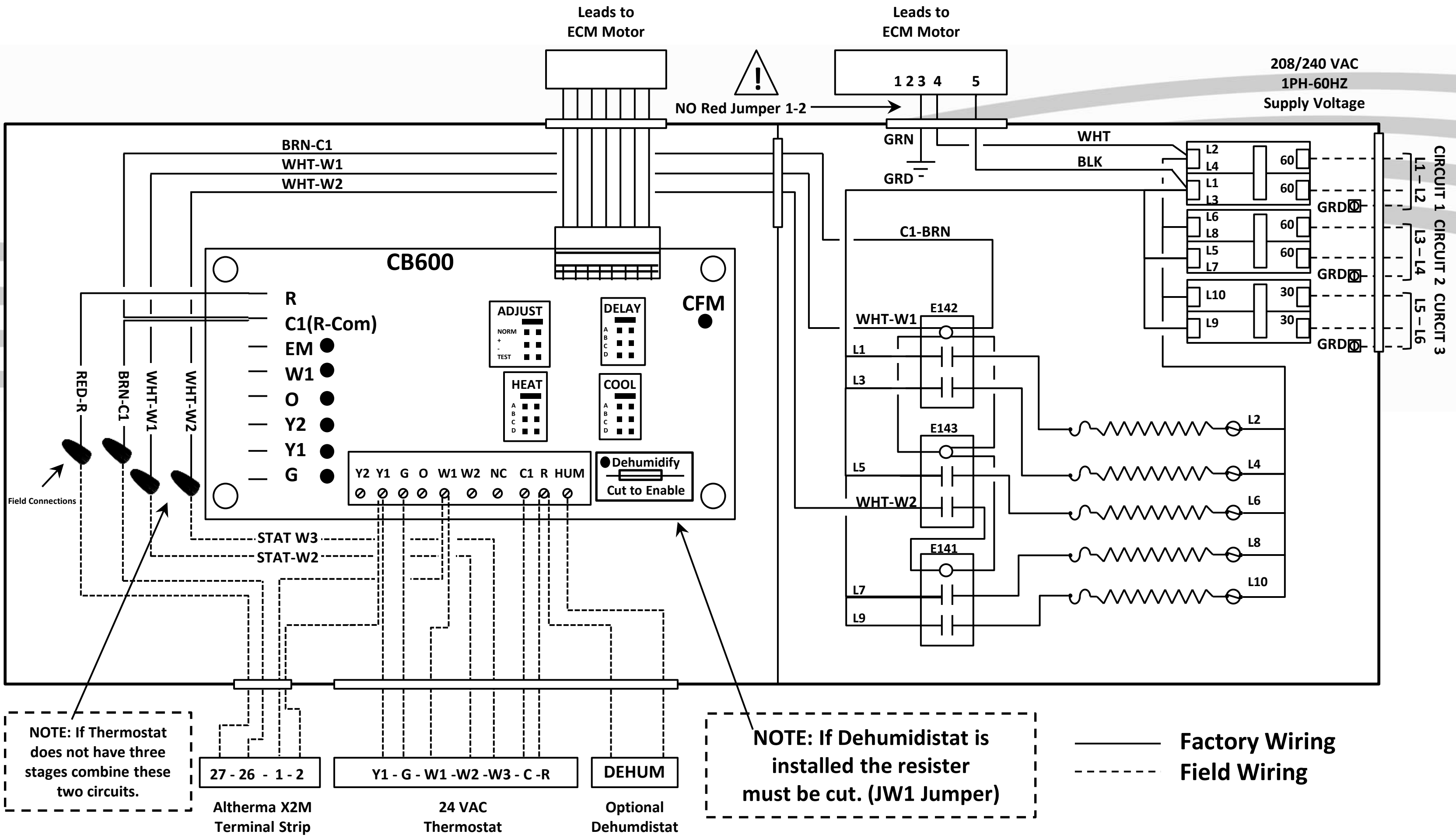
NOTE: If Dehumidist is installed the resister must be cut. (JW1 Jumper)

Factory Wiring

Field Wiring

Hydronic Fan Coil Unit – Internal Wiring Example (cont.)

EFWT_AEVJU-25 Fan Coil (208/240V-ECM-25kW Electric Heat) / Altherma



NOTE: If Thermostat does not have three stages combine these two circuits.

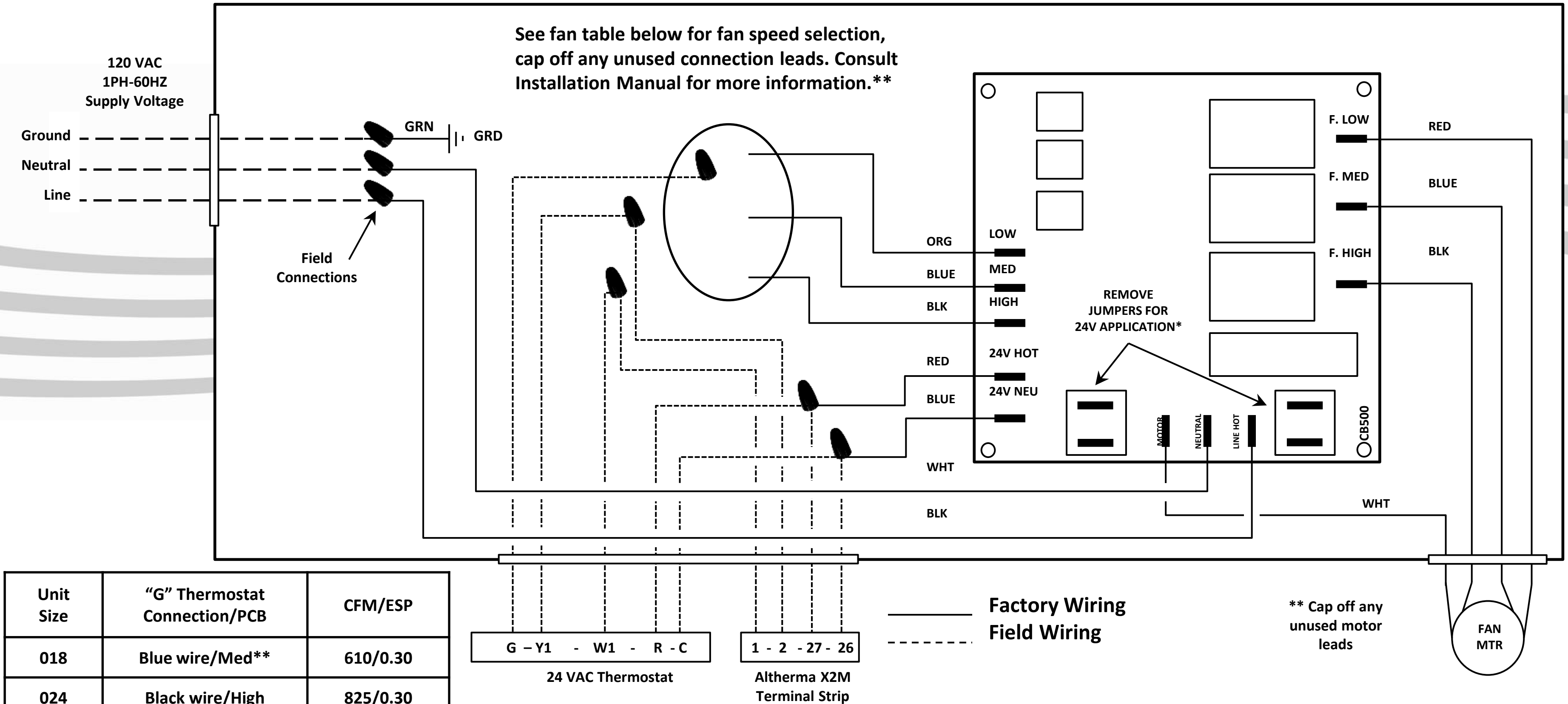
NOTE: If Dehumidistat is installed the resister must be cut. (JW1 Jumper)

——— Factory Wiring

- - - - - Field Wiring

Hydronic Fan Coil Unit – Internal Wiring Example (cont.)

EFWT_APVLU Fan Coil (120V-PSC) / Altherma



Unit Size	"G" Thermostat Connection/PCB	CFM/ESP
018	Blue wire/Med**	610/0.30
024	Black wire/High	825/0.30
030	Blue wire/Med**	1010/0.20
036	Black wire/High	1220/0.05
048	Black wire/High	1620/0.20
060	Black wire/High	1840/0.50

NOTE:
* - Remove 2 red jumpers from fan coil PCB for 24 volt control circuit
** - When Blue wire/Med fan speed is selected, verify Med-Hi tap on motor being used

EFWT ECM Fan Coil Unit – Fan Speed Selection

When installing the fan coil an appropriate fan speed needs to be selected prior to start up.

The installation manual has this chart for the installer to make use of and make the selection simple and easy to do.

This chart is for both ECM fan motor fan coils; 120VAC & 208/240VAC units.

EFWT018 (EFWT024)										Fan Speed Tap Settings
Model	Operation Mode	Control Board Select Tap:								
		Cool Tap				Heat Tap				
		A	B	C	D	A	B	C	D	
EFWT024 Setup for EFWT018	Cooling thermostat signal	800	700	600	500					Set Cooling tap to C C 600 CFM
	Continuous blower	400	350	300	250					Set Heating tap to C C 600 CFM
	Heating thermostat signal					800	700	600	500	

EFWT024										Fan Speed Tap Settings
Model	Operation Mode	Control Board Select Tap:								
		Cool Tap				Heat Tap				
		A	B	C	D	A	B	C	D	
EFWT024	Cooling thermostat signal	800	700	600	500					Set Cooling tap to A A 800 CFM
	Continuous blower	400	350	300	250					Set Heating tap to A A 800 CFM
	Heating thermostat signal					800	700	600	500	

EFWT030 (EFWT036)										Fan Speed Tap Settings
Model	Operation Mode	Control Board Select Tap:								
		Cool Tap				Heat Tap				
		A	B	C	D	A	B	C	D	
EFWT036 Setup for EFWT030	Cooling thermostat signal	1200	1050	900	750					Set Cooling tap to B B 1050 CFM
	Continuous blower	600	525	400	375					Set Heating tap to B B 1050 CFM
	Heating thermostat signal					1200	1050	900	750	

EFWT036										Fan Speed Tap Settings
Model	Operation Mode	Control Board Select Tap:								
		Cool Tap				Heat Tap				
		A	B	C	D	A	B	C	D	
EFWT036	Cooling thermostat signal	1200	1050	900	750					Set Cooling tap to A A 1200 CFM
	Continuous blower	600	525	400	375					Set Heating tap to A A 1200 CFM
	Heating thermostat signal					1200	1050	900	750	

EFWT048										Fan Speed Tap Settings
Model	Operation Mode	Control Board Select Tap:								
		Cool Tap				Heat Tap				
		A	B	C	D	A	B	C	D	
EFWT048	Cooling thermostat signal	1600	1400	1200	1000					Set Cooling tap to A A 1600 CFM
	Continuous blower	800	700	600	500					Set Heating tap to A A 1600 CFM
	Heating thermostat signal					1600	1400	1200	1000	

EFWT060										Fan Speed Tap Settings
Model	Operation Mode	Control Board Select Tap:								
		Cool Tap				Heat Tap				
		A	B	C	D	A	B	C	D	
EFWT060	Cooling thermostat signal	1825	1700	1600	1400					Set Cooling tap to A A 1825 CFM
	Continuous blower	900	850	800	700					Set Heating tap to A A 1825 CFM
	Heating thermostat signal					1825	1700	1600	1400	

EFWT PSC Fan Coil Unit – Fan Speed Selection

When installing the fan coil an appropriate fan speed needs to be selected prior to start up.

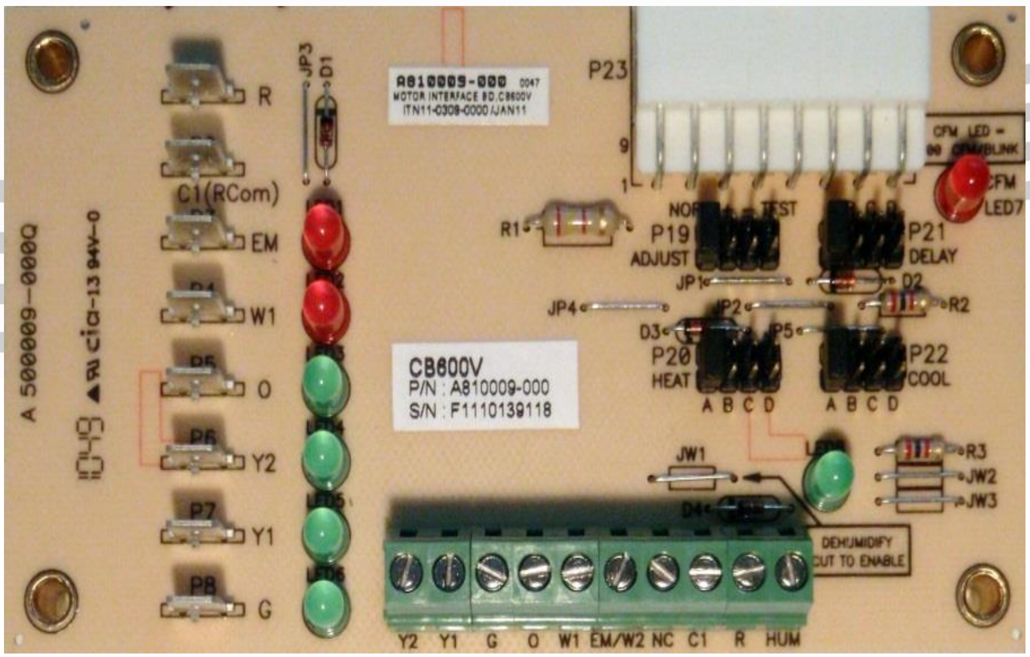
The installation manual has this chart for the installer to make use of and make the selection simple and easy to do.

This chart is for both PSC fan motor fan coils; 120VAC units.

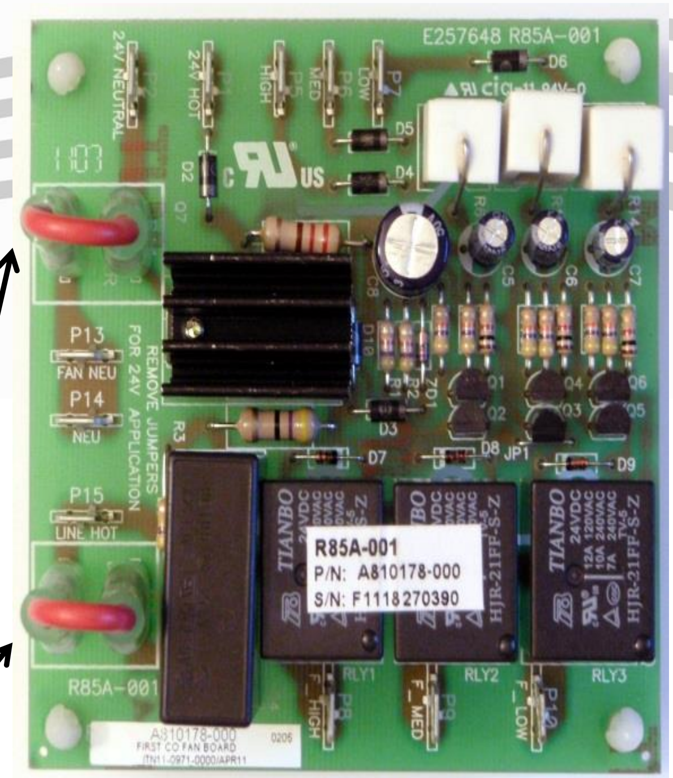
Model	Nominal Cooing Tons	Motor HP-Amp (120V)	Motor Speed	CFM vs. External Static Pressure						Fan Speed Tap Settings
				0.05	0.10	0.20	0.30	0.40	0.50	
EFWT018APVLU (EFWT024 Airflow modified for EFWT018)	1.5	1/5-3.0	High	920	890	825	750	680	580	Connect G from thermostat to motor tap for nominal 600 CFM at desired static
			Med-Hi	750	730	680	610	540	450	
			Med-Low	555	530	480	420	330	- - -	
			Low	350	310	240	170	100	- - -	
EFWT024APVLU	2	1/5-3.0	High	920	890	825	750	680	580	Connect G from thermostat to motor tap for nominal 800 CFM at desired static
			Med-Hi	750	730	680	610	540	450	
			Med-Low	555	530	480	420	330	- - -	
			Low	350	310	240	170	100	- - -	
EFWT030APVLU (EFWT036 Airflow modified for EFWT030)	2.5	1/3-6.0	High	1220	1185	1120	1070	1015	960	Connect G from thermostat to motor tap for nominal 1000 CFM at desired static
			Med-Hi	1085	1060	1010	960	910	865	
			Med-Low	935	915	875	830	775	700	
			Low	750	730	695	650	605	500	
EFWT036APVLU	3	1/3-6.0	High	1220	1185	1120	1070	1015	960	Connect G from thermostat to motor tap for nominal 1200 CFM at desired static
			Med-Hi	1085	1060	1010	960	910	865	
			Med-Low	935	915	875	830	775	700	
			Low	750	730	695	650	605	500	
EFWT048APVLU	4	1/2-8.0	High	1730	1690	1620	1540	1450	1350	Connect G from thermostat to motor tap for nominal 1600 CFM at desired static
			Med	1580	1550	1490	1430	1360	1270	
			Low	1360	1340	1310	1270	1210	1100	
EFWT060APVLU	5	3/4-10.5	High	2030	2000	1950	1900	1840	1770	Connect G from thermostat to motor tap for nominal 2000 CFM at desired static
			Med	1630	1615	1580	1540	1490	1440	
			Low	1280	1270	1240	1210	1180	1140	

Hydronic Fan Coil Unit – EFWT Fan Coil PCBs

EFWT ECM PCB



EFWT PSC PCB



On PSC Units Remove Red Jumpers for all 24VAC Control Circuits

User Interface – Test Button Operation

In addition to last active error code, the Test button can be used to check equipment capacity.

After TEST button is pressed, display will return to normal after 10 seconds if no buttons are pressed.

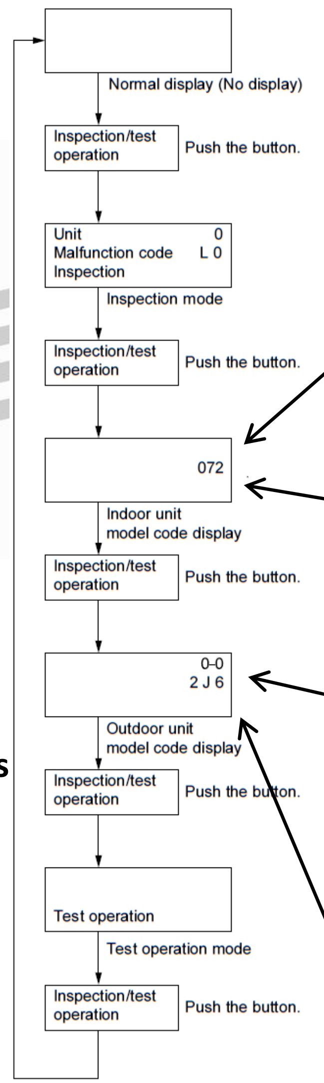
1st press shows last error code

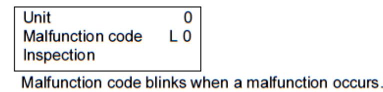
2nd press displays Hydrobox model/capacity

3rd press displays outdoor model/ capacity

4th press displays TEST – Note the has no function in NA. Test Operation is automatic on startup.

5th press returns to normal display





Indoor capacity code

Display	Capacity classification	Display	Capacity classification
	018	112	036
	024	140	048
	030	160	054

Indoor model code

Display	System classification
	Hydrobox 030
72-	Hydrobox 054

Outdoor capacity code

Display	Capacity classification	Display	Capacity classification
	018	112	036
	024	140	048
	030	160	054

Outdoor model code

Display	Model	Voltage
2J6	Large Split/MonoBloc	208/230 1PH
	Small Split	208/230 1PH

Field Settings Table Expanded

Below is the list of possible Field Settings (FS), note: not all of them are available or needed. The application, options (DHW, Bivalent, etc.) and equipment selection will dictate which will need to be adjusted. Some FS greatly impact others, if you are not using the Field Settings Report, consult pages 156 ~ 214 for all FS or the Install Manuals for more detailed information.
Most installs only require about 12 to 15 FS adjusted.
For FS [0-00] ~ [3-00] see pages 161 ~ 168.

1st code	2nd code	Setting name	Default value	Range	Step	Unit
0	User permission level					
	00	User permission level	3	2/3	1	-
1	Outdoor Reset (Weather dependent set point)					
	00	Low ambient temperature (Lo_A)	14/-10	-4~41/-20~5	1.8/1	°F/°C
	01	High ambient temperature (Hi_A)	59/15	50~68/10~20	1.8/1	°F/°C
	02	Set point at low ambient temperature (Lo_TI)	104/40	77~131/25~55	1.8/1	°F/°C
	03	Set point at high ambient temperature (Hi_TI)	77/25	77~131/25~55	1.8/1	°F/°C
2	Disinfection function					
	00	Operation interval	Fri	Mon~Sun, All	-	-
	01	Status	1 (ON)	0/1	-	-
	02	Start time	23:00	0:00~23:00	1:00	hour
	03	Set point	158/70	131~176/40~80	9/5	°F/°C
	04	Interval	10	5~60	5	min
3	Auto restart					
	00	Status	0 (ON)	0/1	-	-

Field Settings Table Expanded (cont.)

Careful attention should be given when deviating from default of the FS Report.

[4-03] can effect FS [5-02], [5-03], [6-00], [6-01], [7-00], [7-01], 8-03], [8-04]

[5-03] can effect FS [4-03]

For FS [4-00] ~ [6-02] see pages 169 ~ 184 and the Install Manuals for more detailed information.

1st code	2nd code	Setting name	Default value	Range	Step	Unit
4	Backup/booster heater operation and space heating off temperature					
	00	Backup heater operation	1 (ON)	0/1	-	-
	01	Backup/booster heater priority	0 (OFF)	0/1/2	-	-
	02	Space heating off temperature	77/25	57.2~77/14~25	1.8/1	°F/°C
	03	Booster heater operation	3	0/1/2/3/4	-	-
	04	Not applicable	-	-	-	-
5	Equilibrium temperature and space heating priority temperature					
	00	Equilibrium temperature status	1 (ON)	0/1	-	-
	01	Equilibrium temperature	32/0	5~95/-15~35	1.8/1	°F/°C
	02	Space heating priority status	1 (ON)	0/1	-	-
	03	Space heating priority temperatures	32/0	5~95-15~20	1.8/1	°F/°C
	04	Set point correction for domestic hot water temperature	18/10	32~68/0~20	1.8/1	°F/°C
6	DT for heat pump domestic water heating mode					
	00	Start	3.6/2	3.6~36/2~20	1.8/1	°F/°C
	01	Stop	3.6/2	0~18/0~10	1.8/1	°F/°C
	02	Not applicable	-	-	-	-

Field Settings Table Expanded (cont.)

For FS [7-00] ~ [9-04] see pages 185 ~ 196 and the Install Manuals for more detailed information.

1st code	2nd code	Setting name	Default value	Range	Step	Unit
7	DT for booster heater and dual set point control					
	00	Domestic hot water step length	0	0~7.2	1.8/1	°F/°C
	01	Hysteresis value booster heater	3.6	3.6~72	1.8/1	°F/°C
	02	Dual set point control status	0 (OFF)	0/1	-	-
	03	Second set point heating	18	1.8~43.2 / 45~99	1.8/1	°F/°C
	04	Second set point cooling	12.6	9~39.6	1.8/1	°F/°C
8	Domestic hot water heating mode timer					
	00	Minimum running time	5	0~20	1	min
	01	Maximum running time	30	5~95	5	min
	02	Anti-recycling time	3	0~10	0.5	hour
	03	Booster heater delay time	50	20~95	5	min
	04	Additional running time at [4-02]/[F-01]	95	0~95	5	min
9	Heating and cooling set point ranges					
	00	Heating set point upper limit	131/55	98.6~131/35~55	1.8/1	°F/°C
	01	Heating set point lower limit	77/25	59~98.6/15~37	1.8/1	°F/°C
	02	Cooling set point upper limit	71.6/22	64.4~71.6/18~22	1.8/1	°F/°C
	03	Cooling set point lower limit	41/5	41~64.4/5~18	1.8/1	°F/°C
	04	Overshoot setting (a)	1.8/1	1.8~7.2/1~4	1.8/1	°F/°C

Field Settings Table Expanded (cont.)

For FS [A-00] ~ [D-03] see pages 197 ~ 211 and the Install Manuals for more detailed information.

1st code	2nd code	Setting name	Default value	Range	Step	Unit
A	Quiet Mode					
	00	Quiet Mode Type	0	0/2	-	-
	01	Parameter 01	3	-	-	-
	02	Not applicable	1	Read only	-	-
C	Setup on EKRP1HB digital I/O PCB					
	00	Solar priority mode setting	0	0/1	1	-
	01	Alarm output logic	0	0/1	1	-
	02	X1-X2 function. Bivalent operation status	0	0/1	1	-
	03	Bivalent ON temperature	32/0	-13~77/-25~25	1.8/1	°F/°C
	04	Bivalent hysteresis	5.4/3	3.6~18/2~10	1.8/1	°F/°C
D	Benefit kWh rate power supply/local shift value weather dependent					
	00	Switching off heaters	0	0/1/2/3	1	-
	01	Unit connection to benefit kWh rate power supply	0 (OFF)	0/1/2	1	-
	02	Not applicable. Do not change the default value	0 (OFF)	-	-	-
	03	Local shift value weather dependent	0 (OFF)	0/1/2/3/4	1	-

Field Settings Table Expanded (cont.)

For FS [E-00] ~ [F-04] see pages 212 ~ 214 and the Install Manuals for more detailed information.

1st code	2nd code	Setting name	Default value	Range	Step	Unit
E	Unit information readout					
	00	Software version	Read only	-	-	-
	01	EEPROM version	Read only	-	-	-
	02	Unit model identification	Read only	-	-	-
	03	Liquid refrigerant temperature	Read only	-	-	°F/°C
	04	Inlet water temperature	Read only	-	-	°F/°C
F	Option setup					
	00	Pump operation stop	0 (enabled)	0/1	1	-
	01	Space cooling permission temperature	68	50~95	1.8/1	°F/°C
	02	Bottom plate heater ON temperature	37.4	37.4~50	1.8/1	°F/°C
	03	Bottom plate heater hysteresis	41	35.6~41	1.8/1	°F/°C
	04	Functionality of X14A (a)	1	0/1	-	-

(a) Only possible to modify the first 3 minutes after power ON. [9-04] & [F-04]

Note: The preferred settings of your Daikin Altherma system are mentioned in Field Settings Report. For more details see installation manual.

User Permission Level

When system is installed and started up the system User Permission Level is OFF (Level 1 = OFF). If required, certain user interface buttons can be made unavailable for the end user.

Three permission levels are defined (see the table on next page). If engaged Level 2 or 3 will be selected based on Field Settings [0-00]

See next 2 pages for how to turn ON and descriptions of each Level

User Permission Level (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
0	User permission level					
	00	User permission level	3	2/3	1	-

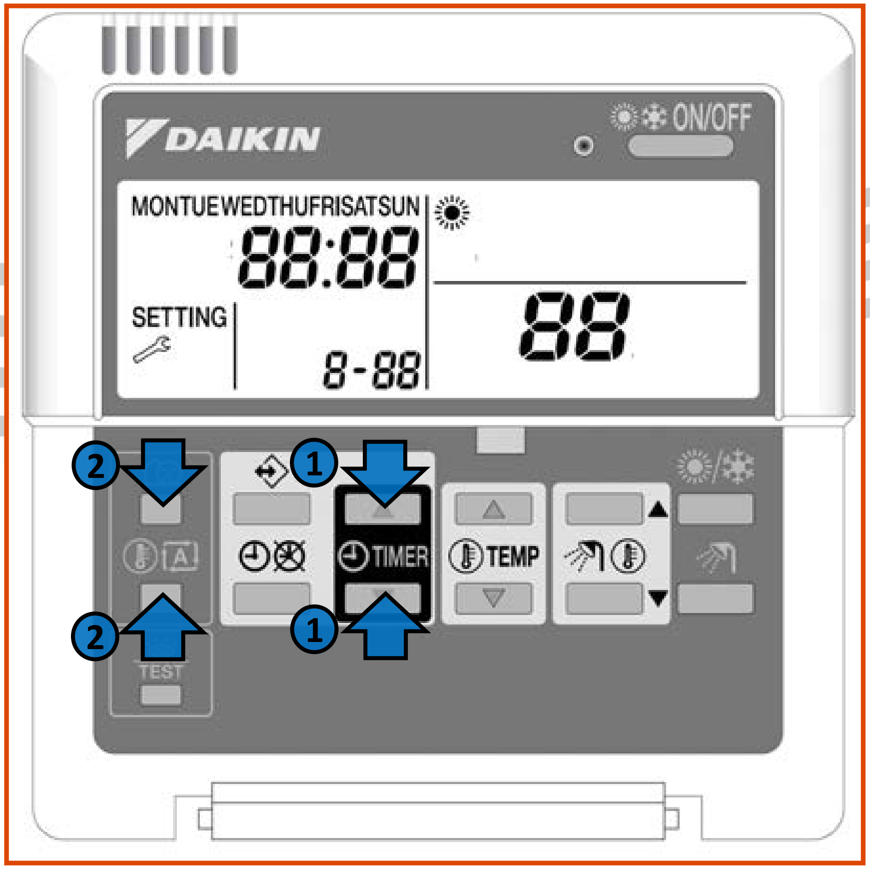
[0-00] User permission level : The level of permission that is available for the end user.

Level 1 = User Permission Level is OFF

Button		Permission level 1	2	3
Quiet mode button		operable	—	—
Weather dependent set point button		operable	—	—
Schedule timer enable/disable button		operable	operable	—
Programming button		operable	—	—
Time adjust buttons	TIMER ▲ TIMER ▼	operable	—	—
Inspection/test operation button	TEST	operable	—	—

User Permission Level (cont.)

How to turn ON and OFF User Permission Level function

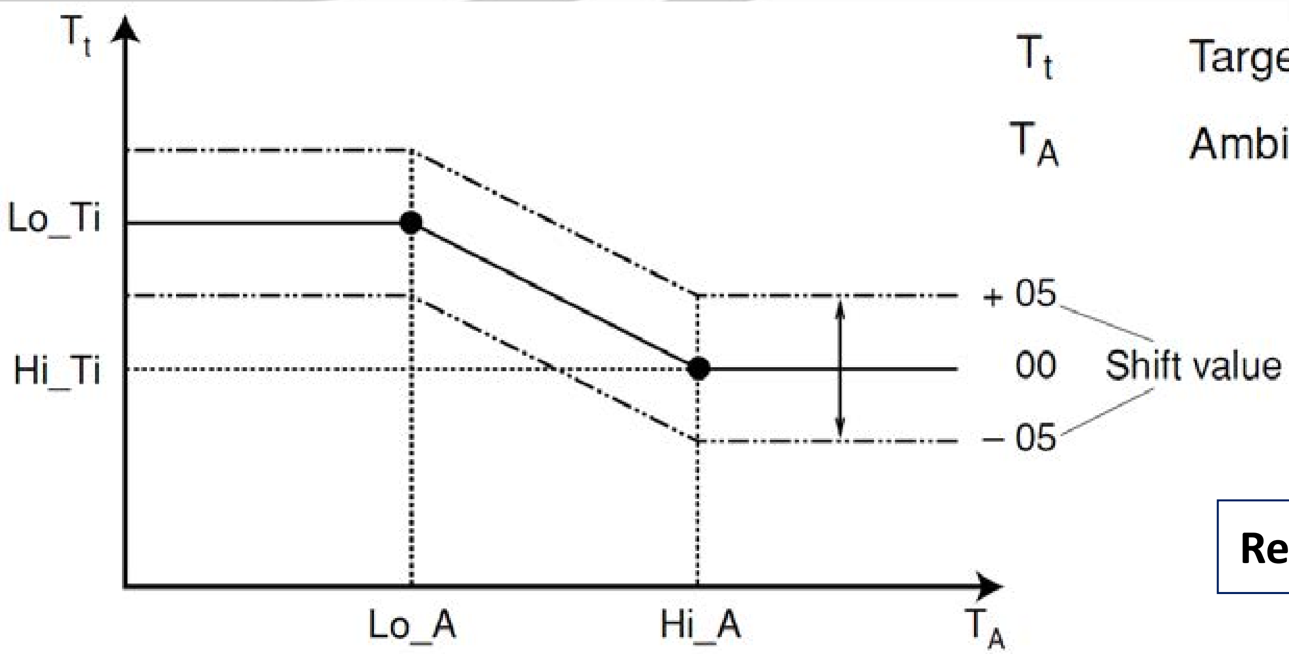


1. Press both the TIMER buttons simultaneously and then press & . Keep all 4 buttons for minimum of 5 seconds to enter Permission Level Mode.
2. Once the above procedure is done the User Level selected in the [0:00] Field Settings will be activated.
3. To deactivate the Permission Level perform Step 1 again.
4. When activating or deactivating the Permission Mode no indication is shown on the display.

Outdoor Reset (Weather Dependant Mode)

Outdoor Reset, the controller calculates the space heating set point temperature based on the outdoor temperature.

However, the user can set a "shift value". This shift value is the temperature difference between the temperature set point calculated by the controller and the real set point. Shift value is -9ºF ~ 9ºF / -5Cº – 5ºC, default 0Fº/0Cº. Use Temp Up, Temp Down buttons for adjustment if desired.



T_t Target water temperature

T_A Ambient (outdoor) temperature

Remark: Lo_Ti > Hi_Ti

Outdoor Reset (Weather Dependant Mode) (cont.)

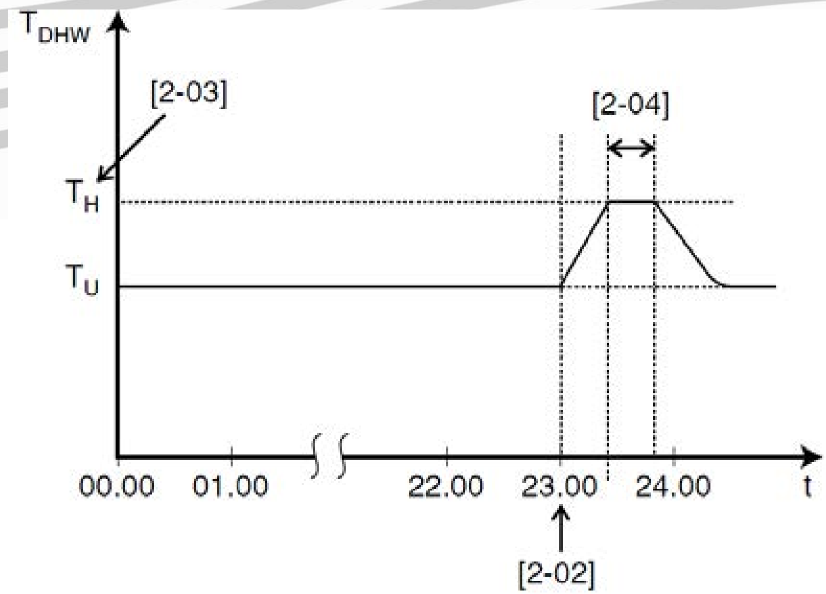
First code	Second code	Setting name	Default value	Range	Step	Unit
1	Outdoor Reset - Weather dependent set point					
	00	Low ambient temperature (Lo_A)	14 / -10	-4 ~ 41 / -20 ~ 5	1.8 / 1	˚F / ˚C
	01	High ambient temperature (Hi_A)	59 / 15	50 ~ 68 / 10 ~ 20	1.8 / 1	˚F / ˚C
	02	Set point low ambient temperature (Lo_TI)	104 / 40	77 ~ 131 / 25 ~ 55	1.8 / 1	˚F / ˚C
	03	Set point high ambient temperature (Hi_TI)	77 / 25	77 ~ 131/ 25 ~ 55	1.8 / 1	˚F / ˚C

Field Code	What to use	Where to get it
1-00	Outside Winter design temp	Manual J heat loss calcs
1-01	Outside temp when you no longer need the Heat ON	Typically this is around 60^{o}F, but can be between 50 to 68^{o}F
1-02	Max water temp of water for loop needed for Heating (low outdoor temp [1-00])	Fan coil specs, radiant specs.. Between 77 and 131^{o}F
1-03	Min water temp of water for loop needed for Heating (high outdoor temp [1-01])	Fan coil specs, radiant specs.. Between 77 and 131^{o}F

Disinfection Function

The disinfection function disinfects the Domestic hot water tank by periodically heating the hot water to a specific temperature.

The default settings do not need to be changed unless you would like to turn the function OFF or adjust to different parameters.



T_{DHW}	Domestic hot water temperature	T_H	High set point temperature [2-03]
T_U	User set point temperature (as set on the user interface)	t	Time

Disinfection Function (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
2	Disinfection function					
	00	Operation interval	Fri	Mon ~ Sun, All	-	-
	01	Status	1 (ON)	0/1	-	-
	02	Start time	23:00	0:00 ~ 23:00	1:00	hour
	03	Set point	158 / 77	104 ~ 176 / 40 ~ 80	5	˚F / ˚C
	04	Interval	10	5 ~ 60	5	min

[2-00] Operation interval: day of the week at which the domestic hot water should be heated.

[2-01] Status: defines whether the function is turned ON (1) or OFF (0).

[2-02] Start time: time of the day at which the domestic hot water should be heated.

[2-03] Set point: high water temperature to be reached.

[2-04] Interval: time period defining how long the set point temperature should be maintained.

Note: Disinfection function operates independently of DHW mode. Even if DHW mode is turned OFF and disinfection function is enabled [2-01] = 1, disinfection function will still operate.

Auto Restart

First code	Second code	Setting name	Default value	Range	Step	Unit
3	Auto restart					
	00	Status	0 (ON)	0/1	-	-

[3-00] Status: defines whether the auto restart function is turned ON (0) or OFF (1).

- **When power returns after a power failure, the auto restart function reapplies the user interface settings at the time of the power failure.**
- **<u>Note</u> If the power failure persists for longer then 2hrs, the clock and day of the week settings are reset and will need to be reset. Field Settings and Schedule Timer Programmed actions will not be lost.**

Backup Heater Operation

First code	Second code	Setting name	Default value	Range	Step	Unit
4	Backup/booster heater operation and space heating off temperature					
	00	Status	1 (ON)	0/1	-	-
	01	Priority	0 (OFF)	0/1/2	-	-
	02	Space heating off temperature	77 / 25	57.2 ~ 77 / 14 ~ 25	1.8 / 1	˚F / ˚C
	03	Booster heater operation	3	0/1/2/3	-	-
	04	Not applicable	2	Read only	-	-

[4-00] Status: defines whether backup heater operation is enabled (1) or disabled (0).

[4-01] Priority: decides whether backup heater & booster heater can operate simultaneously (0), or booster heater operation has priority over backup heater operation (1), backup heater operation has priority over booster heater operation (2).

- Even if the hydrobox is equipped with a backup heater, its operation can still be enabled or disabled by changing field setting.
- Disabling operation of the backup heater might be desirable in some applications to prevent unnecessary energy consumption and costs.
- [4-01] (1) or (2) will only allow one heater to operate at a time. This will reduce average running amps of the entire system since only one heater can operate.

Space Heating OFF Temperature

First code	Second code	Setting name	Default value	Range	Step	Unit
4	Backup/booster heater operation and space heating off temperature					
	00	Status	1 (ON)	0/1	-	-
	01	Priority	0 (OFF)	0/1/2	-	-
	02	Space heating off temperature	77 / 25	57.2 ~ 77 / 14 ~ 25	1.8 / 1	˚F / ˚C
	03	Booster heater operation	3	0/1/2/3	-	-
	04	Not applicable	2	Read only	-	-

[4-02] Space heating OFF temperature:
When the ambient temperature rise above the value of [4-02], the space heating operation will go in forced thermostat OFF.

- This is defaulted to 77^{o}F, the warmest temperature Heating mode can operate, typically this should be set to the same as field setting [1-01]. Outside temp when you no longer need the Heat ON.

Booster Heater Operation

First code	Second code	Setting name	Default value	Range	Step	Unit
4	Backup/booster heater operation and space heating off temperature					
	00	Status	1 (ON)	0/1	-	-
	01	Priority	0 (OFF)	0/1/2	-	-
	02	Space heating off temperature	77 / 25	57.2 ~ 77 / 14 ~ 25	1.8 / 1	˚F / ˚C
	03	Booster heater operation	3	0/1/2/3	-	-
	04	Not applicable	2	Read only	-	-

[4-03] Booster heater operation: defines whether the optional booster heater operation is enabled (1) or has certain limitations (0/2/3).

Powerful Domestic Water Heater Mode – Faster recovery time of the DHW tank can be acheived be pressing and holding the  button for 5 seconds. The DHW heating mode will return to its nomral moperation once the set point is achived. This mode is only avilable if [4-03] = 0/1

[4-03] = 1, then booster heater operation is only determined by booster heater OFF temperature (TBH OFF),booster heater ON temperature (TBH ON) and/or schedule timer.
Refer to setting [7-00] and [7-01] on pages 185 ~ 187.

Booster Heater Operation (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
4	Backup/booster heater operation and space heating off temperature					
	00	Status	1 (ON)	0/1	-	-
	01	Priority	0 (OFF)	0/1/2	-	-
	02	Space heating off temperature	77 / 25	57.2 ~ 77 / 14 ~ 25	1.8 / 1	˚F / ˚C
	03	Booster heater operation	3	0/1/2/3	-	-
	04	Not applicable	2	Read only	-	-

[4-03] Booster heater operation:

[4-03] = 0, then booster heater operation is only allowed during "[2-00] Disinfection function" and "Powerful domestic water heating" (see operation manual). This setting is only recommended in case the capacity of the heat pump can cover the heating requirements of the house and domestic hot water over the complete heating season. The result of this setting is that the domestic hot water will never be heated by the booster heater except for“ [2-00] Disinfection function" and "Powerful domestic water heating“ (see operation manual).

- If the booster heater operation is limited ([4-03]=0) and the ambient outdoor temperature Outdoor ambient “Ta” is lower than the field setting to which parameter [5-03] is set and [5-02]=1, then the domestic hot water will not be heated.
- The consequence of this setting is that the domestic hot water temperature (TDHW) can be maximum the heat pump OFF temperature (THP OFF). Refer to setting of [6-00] and [6-01] on pages 183 and 185.

Booster Heater Operation (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
4	Backup/booster heater operation and space heating off temperature					
	00	Status	1 (ON)	0/1	-	-
	01	Priority	0 (OFF)	0/1/2	-	-
	02	Space heating off temperature	77 / 25	57.2 ~ 77 / 14 ~ 25	1.8 / 1	˚F / ˚C
	03	Booster heater operation	3	0/1/2/3	-	-
	04	Not applicable	2	Read only	-	-

[4-03] Booster heater operation:

[4-03] = 2, then booster heater operation is only allowed if heat pump is out of "operation range" of heat pump domestic water heating mode (TA<[5-03] or TA>95°F (35°C)) or domestic hot water temperature is 3.6°F (2°C) lower then the heat pump OFF temperature (THP OFF) for domestic hot water mode (TDHW>THP OFF–3.6°F (2°C)).
(Refer to setting [5-03] on pages 181 and 182, [6-00] and [6-01] on pages 183 and 185.

Results in the most optimum coverage of domestic hot water heated by the pump.
Has the same functionallity as setting [4-03]=0 added with following conditions:

- TA < [5-03]
- TA > 35˚ C
- $T_{DHW} > T_{HP\ OFF} - 3.6^oF/2^oC$

Booster Heater Operation (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
4	Backup/booster heater operation and space heating off temperature					
	00	Status	1 (ON)	0/1	-	-
	01	Priority	0 (OFF)	0/1/2	-	-
	02	Space heating off temperature	77 / 25	57.2 ~ 77 / 14 ~ 25	1.8 / 1	˚F / ˚C
	03	Booster heater operation	3	0/1/2/3	-	-
	04	Not applicable	2	Read only	-	-

[4-03] Booster heater operation:

[4-03] = 3 (default setting), then booster heater operation is the same as setting 1, except that booster heater is OFF when the heat pump is active in domestic hot water mode. The consequence of this functionality is that setting [8-03] is not relevant. Results in optimum coverage of domestic hot water heated by heat pump in relation with [8-04]. Powerful DHW Mode is not available with this setting.

- When setting [4-03]=1/2/3, the booster heater operation can still be restricted by the schedule timer as well. I.e., when booster heater operation is preferred during certain period of the day. (See operation manual)
- When setting [4-03]=2, the booster heater will be allowed to operate when TA<[5-03] independent of the status of [5-02]. If bivalent operation is enabled and permission signal for auxiliary boiler is ON, the booster heater will be restricted even when TA<[5-03]. (See [C-02] on page 205).
- Booster heater is always allowed during powerful and disinfection function, except for the period that the backup heater operation is required for safety reasons and [4-02]=1.

Freeze Protection – MonoBloc Only

First code	Second code	Setting name	Default value	Range	Step	Unit
4	Backup/booster heater operation and space heating off temperature					
	00	Status	1 (ON)	0/1	-	-
	01	Priority	0 (OFF)	0/1/2	-	-
	02	Space heating off temperature	77 / 25	57.2 ~ 77 / 14 ~ 25	1.8 / 1	˚F / ˚C
	03	Booster heater operation	3	0/1/2/3	-	-
	04	Freeze-up protection function	0	0/1	0	-

[4-04] Freeze-up protection function:

[4-04] = 0: continuous pump activation.

If compressor not running & low ambient temp then:

- Pump operation related to Ambient Temp.
- Continuous or interval pump operation related to water temp.
- Back Up heater request related to water temp.

[4-04] = 1: non-continuous pump activation.

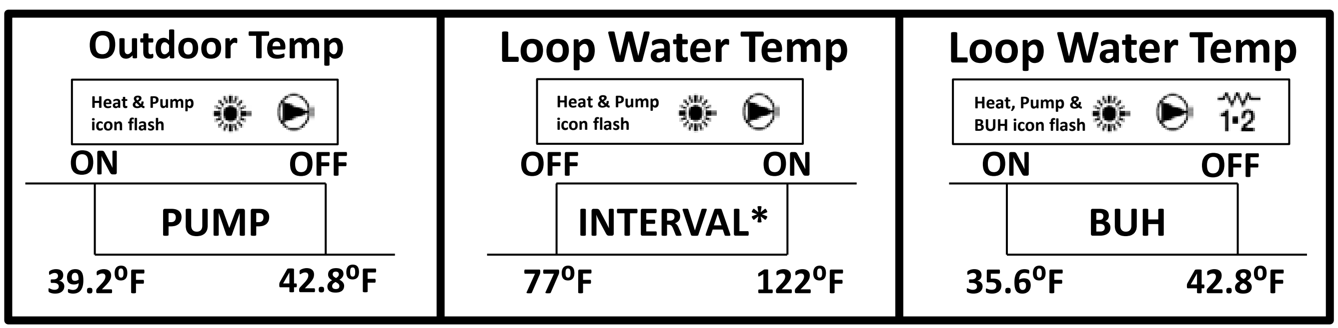
If compressor not running & low ambient temp then:

- Pump operation related to water temp.
- Back Up heater request related to water temp.
- No interval timer needed as pump switch off at 48.2^{o}F or 9^{o}C.

Special procedure: This setting [4-04] can only be changed the first three minutes after unit power on. After 3 minutes this the parameter can be modified but the modified value will not be accepted.

Freeze Protection – MonoBloc Only (cont.)

- The Daikin Altherma MonoBloc has built in freeze protection. If the outdoor air temperature drops below 39.2°F the internal water pump will operate.
- If at the same time the loop water temp drops below 35.6°F the Altherma's backup heater will cycle ON & OFF as needed.
- In casses where the outdoor temperature is low but the loop water temperature is high the pump will cycle ON and OFF as needed (Interval).
- If the MonoBloc has a call for Heating, Cool or DHW mode, the syetm will automaticly turn OFF freeze protection.
- If the below air or water ON temperatures occur, the pump and BUH will operate until their OFF temperature is reached. When these actions are active the interface flash the following icons:



* Interval or continuous pump operation related to water temp, (Interval: 5 min. ON – 5 min. OFF).

Equilibrium (Balance Point) and Space Heating Priority Temperature

- When the balance point temperature function is enabled, operation of the backup heater is restricted to low outdoor temperatures. (not until when the outdoor temperature equals or drops below the specified balance point temperature will the backup heater be allowed to operate).

- Enabling this function reduces the working time of the backup heater.

- When the function is disabled, operation of the backup heater is possible at all outdoor temperatures.

- Recommended to Enable for reduced energy usage
- The temperature selected is taken from the Field Settings Report (Selection Software), the temperature generated by the software is the point at which the heat pump can no longer maintain the required BTU load of the application by itself.

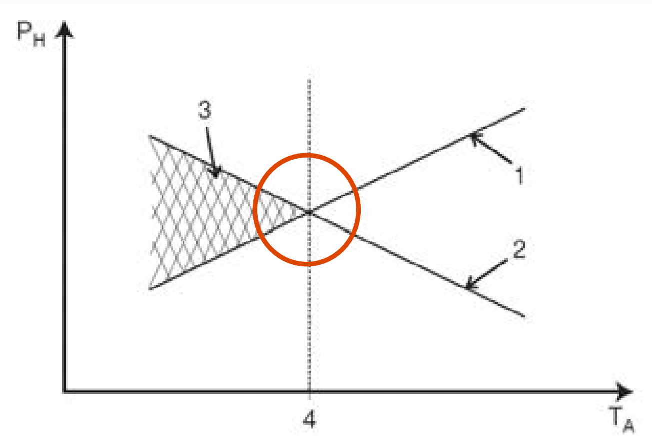
DAIKIN altherma

R-410A INVERTER

Balance Point and Space Heating Priority Temperature (cont.)

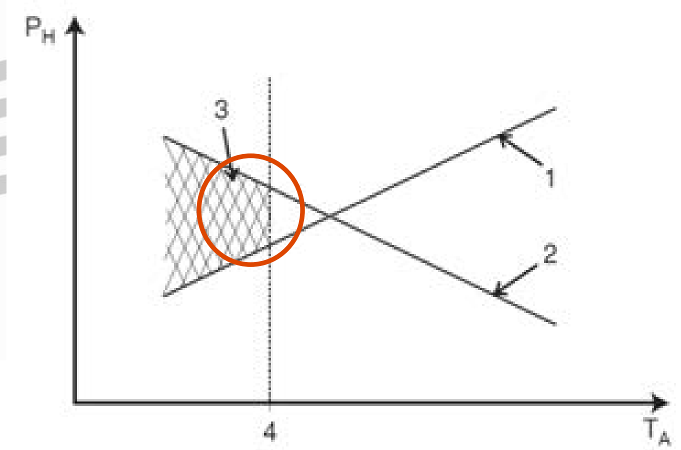
Disabled

The balance point temp is determined by the complete system



Enabled

The balance point temp is determined by the Daikin Altherma Selection Software.



1: Heat pump (outdoor unit) capacity
2: Required heating capacity (site dependent)
3: Additional heating capacity provided by the backup heater
4: Balance point temperature
T_A: Ambient (outdoor) temperature
P_H: Heating capacity

Balance Point and Space Heating Priority Temperature (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
5		Equilibrium temperature status and space heating priority temperature				
	00	Equilibrium temperature status	1 (ON)	0/1	-	-
	01	Equilibrium temperature	32 / 0	5 ~ 68 / -15 ~ 20	1.8 / 1	˚F / ˚C
	02	Space heating priority status	0 (OFF)	0/1	-	-
	03	Space heating priority temperature	0	5 ~ 68 / -15 ~ 20	1.8 / 1	˚F / ˚C
	04	Set point correction for domestic hot water	18 / 10	0 ~ 36 / 0 ~ 20	1.8 / 1	˚F / ˚C

[5-00] Balance point temperature status: specifies whether the balance point temperature function is enabled (1 default) or disabled (0) for low outdoor temperatures.

[5-01] Balance point temperature: below this outdoor temperature operation of the backup heater is allowed.

[5-01] This temperature setting is taken from the selection software field settings report. The selection software calculates Altherma's capacity at design conditions and calculated the balance point point for you. (Equilibrium = Balance Point)

Balance Point and Space Heating Priority Temperature (cont.)

When the space heating priority function is enabled, the domestic hot water will only be heated by the booster heater when the outdoor temperature equals or drops below the specified space heating priority temperature.

This assures that the full capacity of the heat pump (outdoor unit) is available for space heating.

Disabling this function reduces the working time of the of the booster heater, but might result in below-desired space heating temperature.

DAIKIN altherma

R-410A INVERTER

Balance Point and Space Heating Priority Temperature (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
5	Equilibrium temperature status and space heating priority temperature					
	00	Equilibrium temperature status	1 (ON)	0/1	-	-
	01	Equilibrium temperature	32 / 0	5 ~ 68 / -15 ~ 20	1.8 / 1	˚F / ˚C
	02	Space heating priority status	0 (OFF)	0/1	-	-
	03	Space heating priority temperature	0	5 ~ 68 / -15 ~ 20	1.8 / 1	˚F / ˚C
	04	Set point correction for domestic hot water	18 / 10	0 ~ 36 / 0 ~ 20	1.8 / 1	˚F / ˚C

[5-02] Space heating priority status: specifies whether space heating priority is enabled (1) or disabled (0) for low outdoor temperatures.

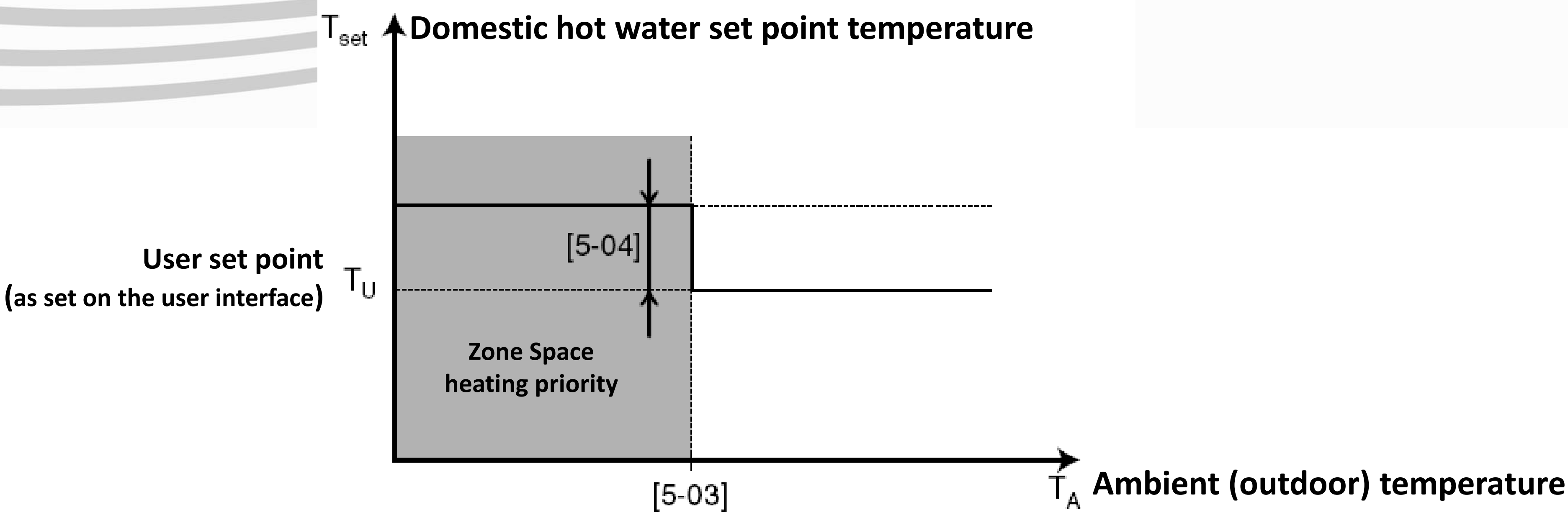
[5-03] Space heating priority temperature: below this outdoor temperature, the sanitary water will be heated by the booster heater only,

[5-04] Set point correction for domestic hot water temperature: set point correction for the desired domestic hot water temperature, to be applied at low outdoor temperature when space heating priority is enabled.

Balance Point and Space Heating Priority Temperature (cont.)

Set point correction for hot water temperature [5-04]

The corrected (higher) set point will make sure that the total heat capacity of the water in the tank remains approximately unchanged, by compensating for the colder bottom water layer of the tank (because the heat exchanger coil is not operational) with a warmer top layer.



DT for Domestic Hot Water Heating Setting

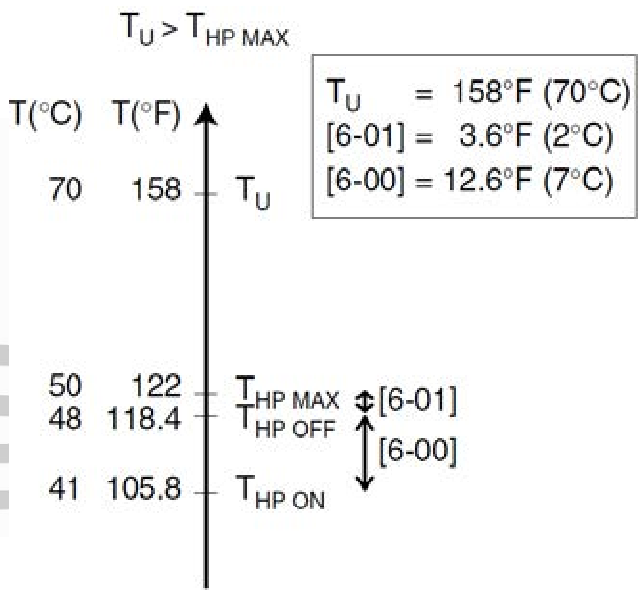
First code	Second code	Setting name	Default value	Range	Step	Unit
6	DT for domestic water heating					
	00	Start	9 / 5	1.8 ~ 36 / 1 ~ 20	1.8 / 1	˚F / ˚C
	01	Stop	3.6 / 2	3.6 ~ 18 / 2 ~ 10	1.8 / 1	˚F / ˚C

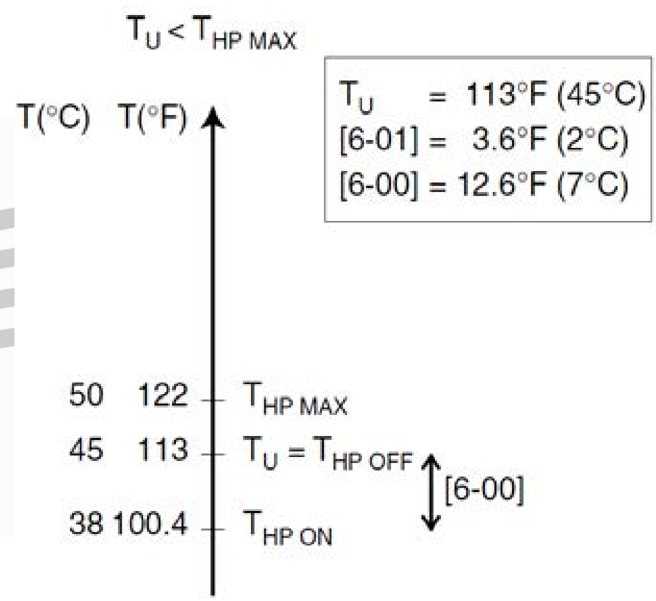
[6-00] Start: temperature difference determining the heat pump ON temperature.

[6-01] Stop: temperature difference determining the heat pump OFF temperature.
(temperature difference based on the "Maximum heat pump temperature")

- When the domestic hot water temperature drops below the heat pump ON temperature, the heat pump will be turned on.
- As soon as the domestic hot water temperature reaches the heat pump OFF temperature, the heat pump will be turned off.

DT for Domestic Hot Water Heating Setting (cont.)





T_A	**Outdoor ambient**
$T_{HP\ MAX}$	**Maximum heat pump temperature at sensor in domestic hot water tank (122°F)(50°C)(depending on T_A)**
$T_{HP\ OFF}$	**Heat pump OFF temperature**
$T_{HP\ ON}$	**Heat pump ON temperature**

030 Max Heat Pump DHW Temp @

$T_A \leq$ 41°F(5°C) – Max Heat Pump DHW 118.4°F(48°C)

T_A = 41°F(5°C) ~ 77°F(25°C) – Max Heat Pump DHW 122°F(50°C)

$T_A \geq$ 77°F(25°C) – Max Heat Pump DHW 113°F(45°C)

054 Max Heat Pump DHW Temp @

$T_A \leq$ 77°F(25°C) – Max Heat Pump DHW 122°F(50°C)

$T_A \geq$ 77°F(25°C) – Max Heat Pump DHW 118.4°F(48°C)

Domestic Hot Water Step Length

When the hot water is heated and the hot water set point temperate (as set by the user) has been reached, the booster heater will continue to heat the hot water to a temperature a few degrees above the set point temperature.

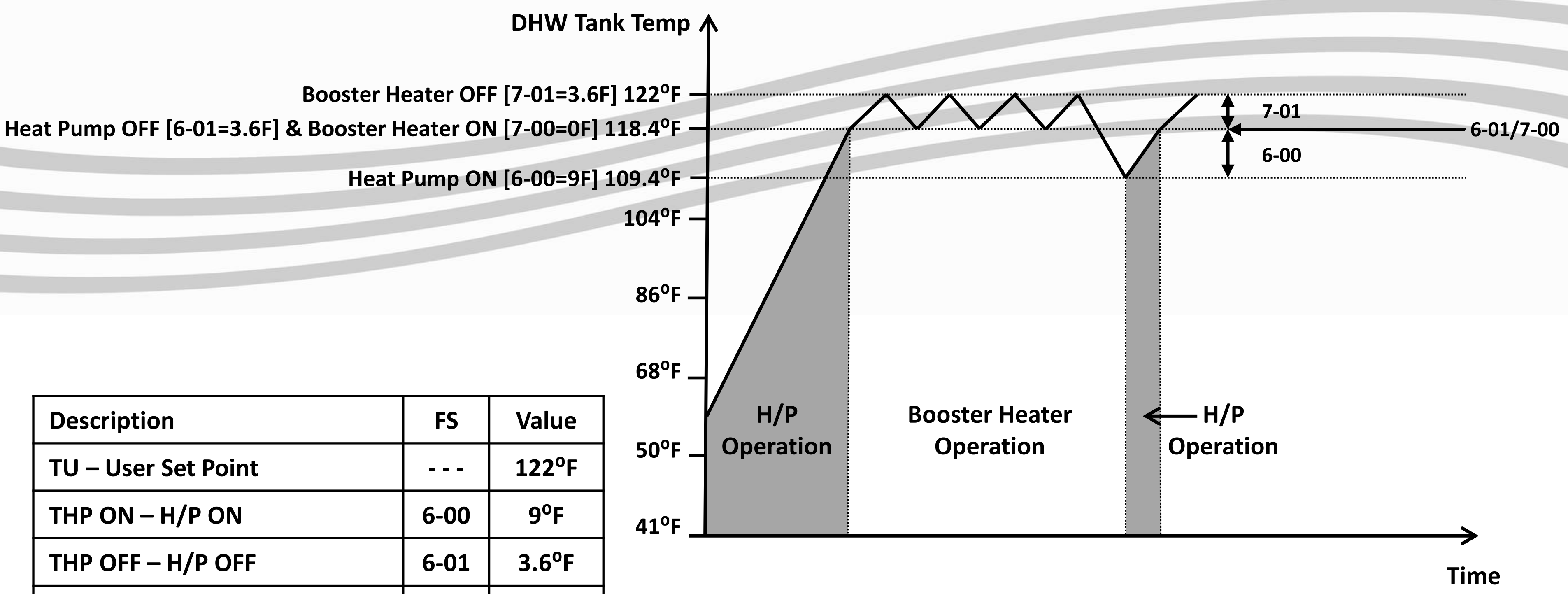
These extra degrees are specified by the hot water step length field setting. Correct setting prevents the booster heater from repeatedly turning ON and OFF (i.e. chattering) to maintain the domestic hot water set point temperature.

Note: the booster heater will turn back on when the hot water temperature drops 3.6^{o}F/2^{o}C (fixed value) below the set point temperature of the BSH (TH BH OFF).

Domestic Hot Water Step Length (cont.)

DHW Tank in relation to DHW demand

This example uses a tank set point of 122°F & the default Field Settings listed below



Description	FS	Value
TU – User Set Point	- - -	122°F
THP ON – H/P ON	6-00	9°F
THP OFF – H/P OFF	6-01	3.6°F
TBH ON – Booster Heater ON	7-00	0°F
TBH OFF – Booster Heater OFF	7-01	3.6°F

Domestic Hot Water Step Length (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
7	DT for booster heater and dual set point control					
	00	Domestic hot water step length	0	0 ~ 7.2 / 0 ~ 4	1.8 / 1	˚F / ˚C
	01	Hysteresis value booster heater	3.6 / 2	3.6 ~ 72 / 2 ~ 40	1.8 / 1	˚F / ˚C
	02	Dual set point control status	0	0/1	-	-
	03	Second set point heating	18	1.8 ~ 43.2 – 77 ~ 131	1.8	˚F
			10	1 ~ 24 – 25 ~ 55	1	˚C
	04	Second set point cooling	44.6 / 7	41 ~ 71.6 / 5 ~ 22	1.8 / 1	˚F / ˚C

[7-00] Domestic hot water step length: temperature difference above the domestic hot water set point temperature before the booster heater is turned off

[7-01] Hysteresis value booster heater: temperature difference determining the booster heater ON temperature (TBH ON). TBH ON = TBH OFF – [7-01]

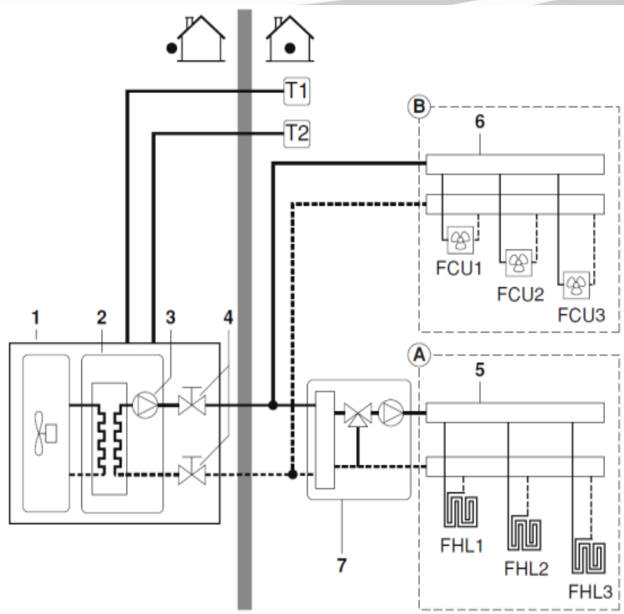
The minimum value for booster heater ON temperature (TBH ON) is 3.6°F (2°C) (fixed) below heat pump OFF temperature (THP OFF).

Dual Set Point Control

Dual Set point is available for Heating and Cooling

Applies only to installations with different heat emitter which require different set points.
Dual set point control makes it possible to generate 2 different set points.

When engaged Heating and Cooling modes can only be changes over at user interface.



	Set point	Field setting	Thermo status			
Zone A	First	UI	ON	OFF	ON	OFF
Zone B	Second	[7-03]	OFF	ON	ON	OFF
Resulting water temperature			UI	[7-03]	[7-03]	—
Result pump operation			ON	ON	ON	OFF

1	Outdoor unit	7	Mixing station (field supply)
2	Heat exchanger	T1	Room thermostat for zone A (optional)
3	Pump		
4	Shut-off valve	T2	Room thermostat for zone B (optional)
5	Collector zone A (field supply)	FCU1..3	Fan coil unit (optional)
6	Collector zone B (field supply)	FHL1...3	Floor heating loop (field supply)

Dual Set Point Control (cont.)

When dual set point is enabled, the pump operation will be determined depending on the status of the DIP switch SS2-3 and set point selection contacts. Refer to the pump operation configurations when the thermostat is connected or not as described above.

When dual set point is enabled, the "forced continuous pump operation" is not possible. When SS2-3 is ON while SP1 and SP2 are both closed, the pump operation will be the same operation as "with room thermostat" and the second set point will be the applicable set point. Refer to "Dual set point control" in the Installation Manual.

The following table summarizes the required configuration and wiring at the terminal block (X2M: 1, 2, 4) in the switch box. Pump operation is listed in the third column. The three last columns indicate whether the following functionality is available on the user interface (UI) or handled by the set point selection contacts SP1 and SP2:

- **space heating or cooling on/off (ON/OFF)**
- **heating/cooling changeover ( )**
- **heating and cooling schedule timers ( )**

(a) **The pump will stop when space heating/cooling is turned off or when the water reaches the desired water temperature as set on the user interface. With space heating/cooling turned on, the pump will then run every 5 minutes during 3 minutes to check the water temperature.**

Dual set point				
Configuration	Pump operation			
• [7-02]=1 • SS2-3 = OFF • wiring: X2M 1 2 3 4 SP2 SP1	determined by leaving water temperature[(a)]	UI	UI	UI
• [7-02]=1 • SS2-3 = ON • wiring: X2M 1 2 3 4 SP2 SP1	on when main or/and sub set point is requested	SP2/SP1	UI	—

SP1 =First set point contact

SP2 =Second set point contact

Dual Set Point Control (cont.)

- The first set point heating/cooling is the set point selected on the user interface.
  - In heating mode the first set point can be a fixed value or outdoor reset.
  - In cooling mode the first set point is always a fixed value.
- The second set point heating [7-03] should be linked to the heat emitters which requires the highest set point in heating mode. Example: fan coil unit.
- The second set point cooling [7-04] should be linked to the heat emitters which requires the lowest set point in cooling mode. Example: fan coil unit.
- The actual second set point heating value depends on the selected value of setting [7-03].
  - In case [7-03]=1.8~43.2°F (1~24°C), the actual second set point will be first set point heating increased with [7-03] (the maximum is 131°F (55°C)).In this way the second set point heating is linked to the first set point heating.
  - In case [7-03]=77~131°F (25~55°C), the actual second set point heating is equal to [7-03].

Dual Set Point Control (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
7	DT for booster heater and dual set point control					
	00	Domestic hot water step length	0	0 ~ 7.2 / 0 ~ 4	1.8 / 1	˚F / ˚C
	01	Hysteresis value booster heater	3.6 / 2	3.6 ~ 72 / 2 ~ 40	1.8 / 1	˚F / ˚C
	02	Dual set point control status	0	0/1	-	-
	03	Second set point heating	18 10	1.8 ~ 43.2 – 77 ~ 131 1 ~ 24 – 25 ~ 55	1.8 1	˚F ˚C
	04	Second set point cooling	44.6 / 7	41 ~ 71.6 / 5 ~ 22	1.8 / 1	˚F / ˚C

[7-02] Dual set point control status: defines whether the dual set point control is enabled (1) or disabled (0).

[7-03] Second set point heating: specifies the second set point temperature in heating operation.

[7-04] Second set point cooling: specifies the second set point temperature in cooling operation.

Remark: No indication available which set point is active.

Domestic Hot Water Heating Mode Timer

First code	Second code	Setting name	Default value	Range	Step	Unit
8	Domestic water heater mode timer					
	00	Minimum running time	5	0 ~ 20	1	min
	01	Maximum running time	30	5 ~ 95	5	min
	02	Anti-recycling time	3	0 ~ 10	0.5	hour
	03	Booster heater delay time	20	20 ~ 95	5	min

[8-00] Minimum running time: specifies the minimum time period during which Domestic hot water heating should be activated, even when the target hot water temperature has already been reached.

[8-01] Maximum running time: specifies the maximum time period during which Domestic hot water heating can be activated, even when the target hot water temperature has not yet been reached.

[8-02] Anti-recycling time: specifies the minimum required interval between two H/P Domestic hot water heating cycles.

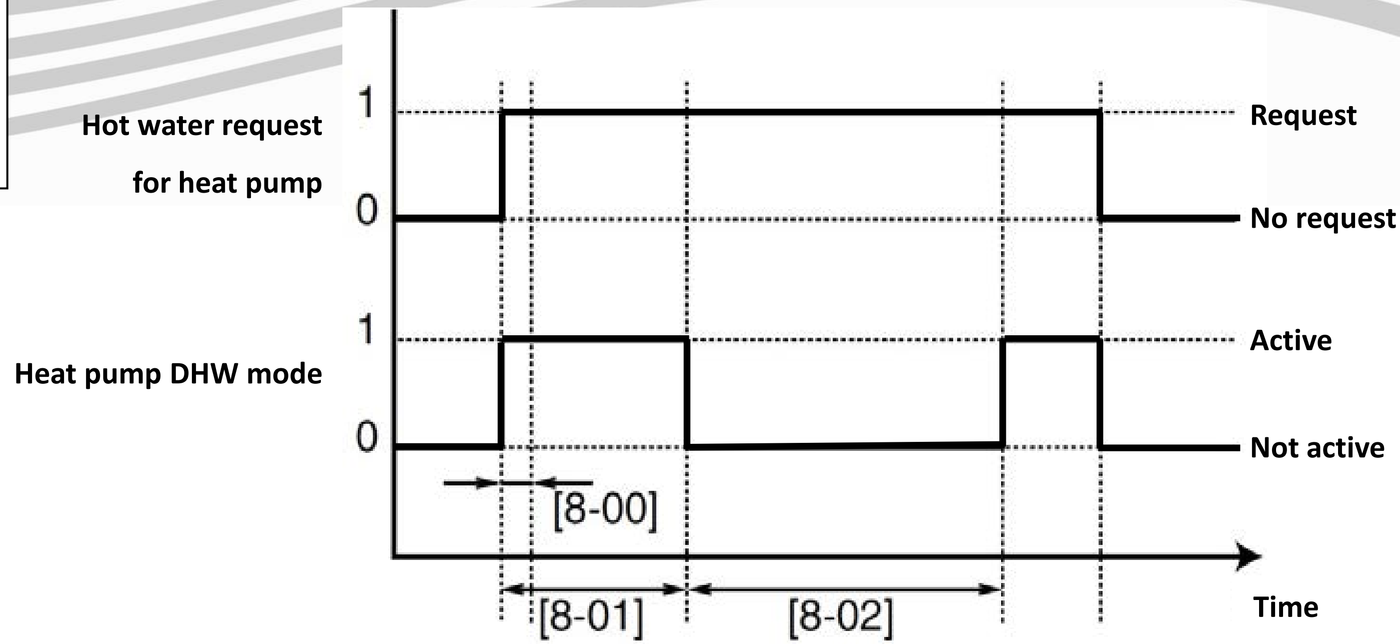
[8-03] Booster heater delay timer: specifies the start-up delay time of booster heater after booster heater thermostat ON. [8-03] only has meaning if [4-03] =1.

Domestic Hot Water Heating Mode Timer (cont.)

The "domestic water heating mode timer" Field Settings defines the minimum and maximum domestic hot water heating times, and minimum time between two domestic hot water heating cycles.

If the outdoor temperature is higher than the field setting to which parameter [4-02] is set, then field settings of parameters [8-01], [8-02], and [8-04] are not considered.

Only applicable for the heat pump.



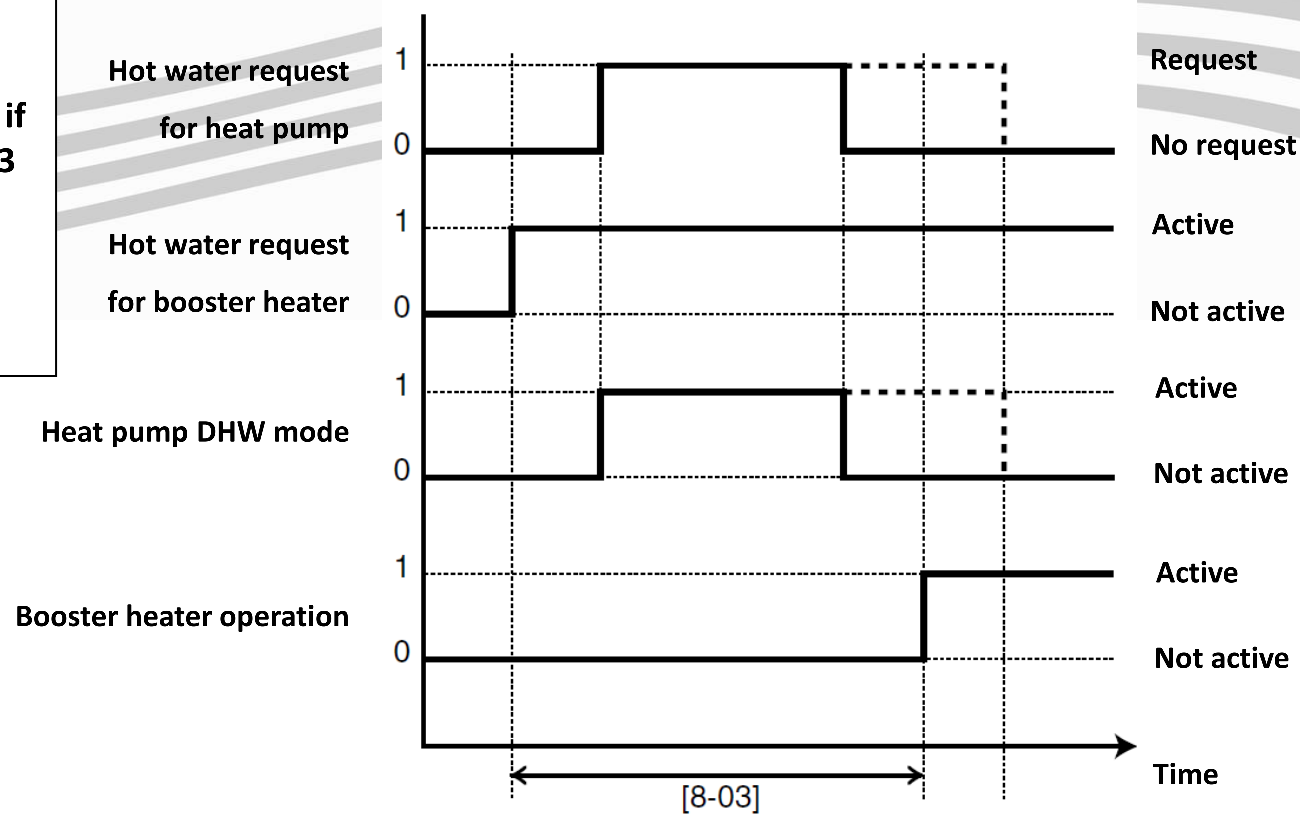
Domestic Hot Water Heating Mode Timer (cont.)

The 'Domestic water heating mode timer' field settings defines the start-up time delay of the Booster heater operation after Booster thermostat ON.

Delay timer is fixed 20 minutes, if heat pump is not active in domestic water heating mode, ELSE [8-03]

The setting [8-03] has only meaning if setting[4-03]=1. Setting [4-03]=0/2/3 limits the booster heater automatically in relation to heat pump operation time in domestic water heating mode.

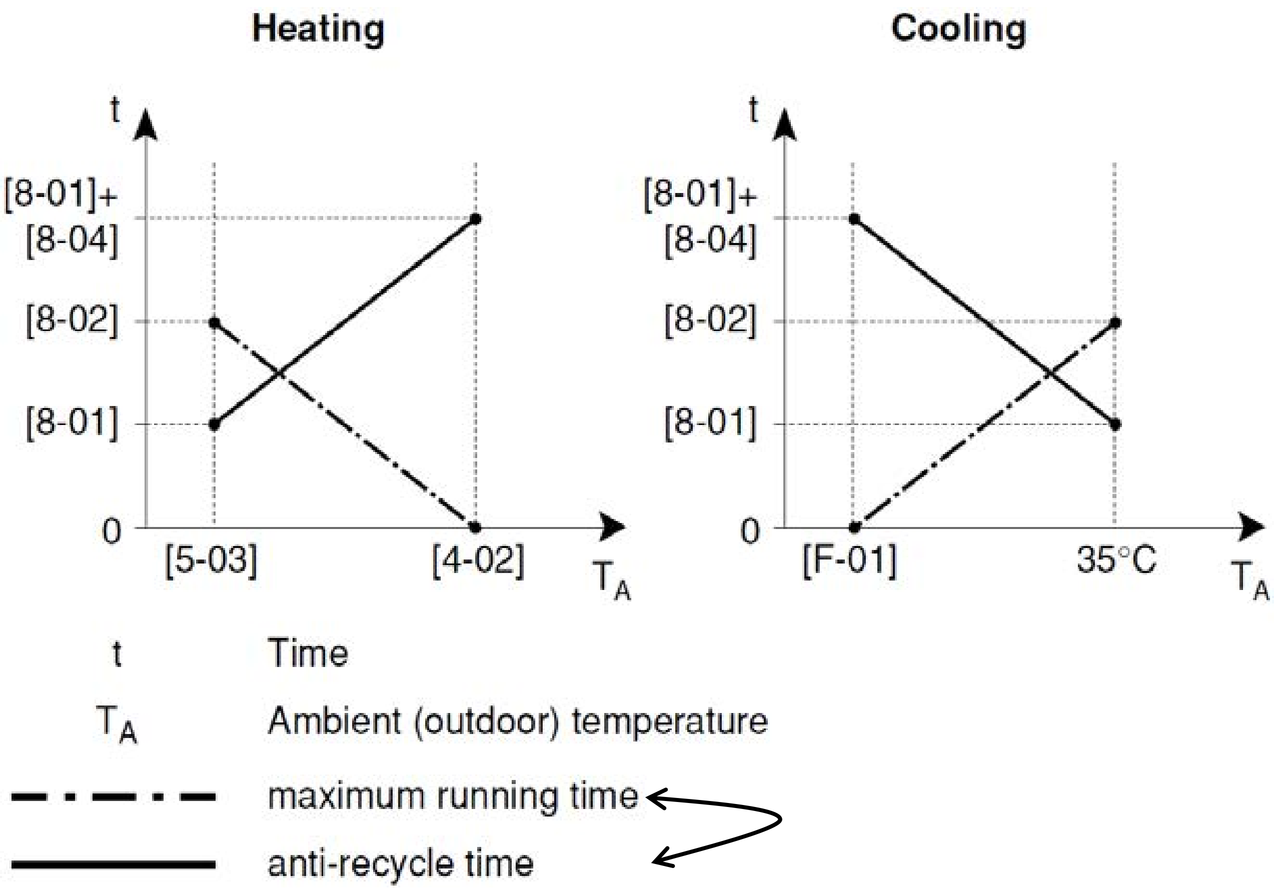
Only applicable for the Booster heater.



Domestic Hot Water Heating Mode Timer (cont.)

Domestic hot water heating mode timer setting

FS [8-04] Additional running time at [4-02]/[F-01]: specifies the additional running time on the maximum running time at outdoor temperature [4-02] or [F-01].



The full advantage of [8-04] will be applicable if setting [4-03] is not 1.

Cooling and Heating Loop Set Point Limitation (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
9	Cooling and heating set point ranges					
	00	Heating set point upper limit	131 / 55	98.6 ~ 131 / 37 ~ 55	1.8 / 1	˚F / ˚C
	01	Heating set point lower limit	59-77 / 15-25	59-77 ~ 98.6 / 15-25 ~ 37	1.8 / 1	˚F / ˚C
	02	Cooling set point upper limit	20	64.4 ~ 71.6 / 18 ~ 22	1.8 / 1	˚F / ˚C
	03	Cooling set point lower limit	5	41 ~ 64.4 / 5 ~ 18	1.8 / 1	˚F / ˚C

Field settings [9-00] ~ [9-03] limit the end user from setting the water temp out of the applied system's range of meeting the needs of the application. These settings are taken from the selection software field setting report.

[9-00] Heating set point upper limit: maximum leaving water temperature for heating operation.

[9-01] Heating set point lower limit: minimum leaving water temperature for heating operation.

[9-02] Cooling set point upper limit: maximum leaving water temperature for cooling operation.

[9-03] Cooling set point lower limit: minimum leaving water temperature for cooling operation.

These settings do not set Heating/Cooling loop set points

Quiet Mode

First code	Second code	Setting name	Default value	Range	Step	Unit
A	Quiet mode type					
	00	Quiet mode type	0	0/2	-	-
	01	Status	3	-	-	-

Quiet Mode is not ON unless the button is pushed. When ON the icon will appear in the display.

[A-00] Quiet Mode Type: two different types of quiet mode operation can be set.

[A-00] = 0 => Reduced performance can occur.

When Quiet Mode is activated on the Altherma interface, the priority is given to the outdoor unit operating quietly under ALL circumstances.

[A-00] = 1 => Reduced performance will not occur.

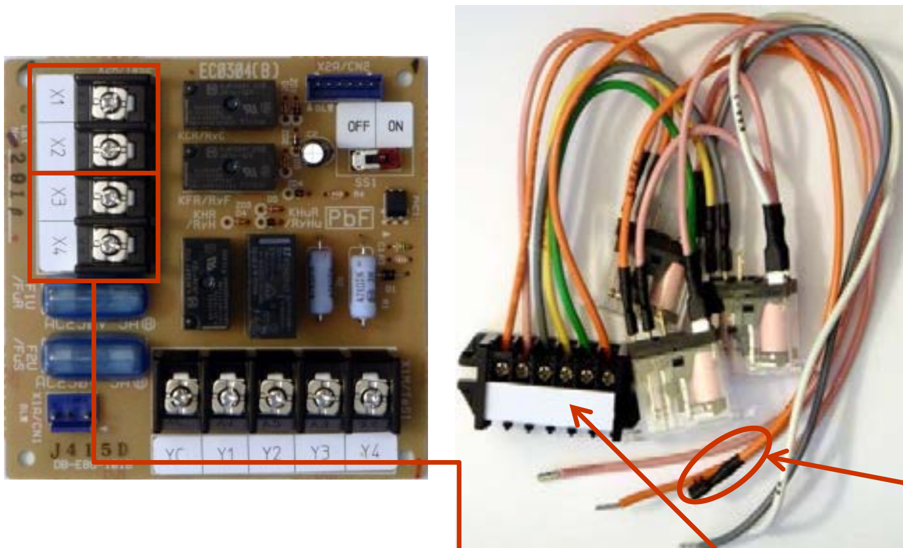
When Quiet Mode is activated on the Altherma interface, the priority is given to the required performance of the outdoor unit.

[A-01] Status: Do not change this default setting!

!(Conflicts during quiet mode operation can occur when default setting is changed)!

EKRP1HB Option

EKRP1HBAAU Digital I/O PCB



X7M Terminal Block

Voltage free contacts
Maximum Load: 1A-24VAC
Minimum Load: 20mA-5VDC

Activation:
X1-X2 NO Contacts, close during Bi-valent operation
X3-X4 NO Contacts, close when X7M 5-6 are shorted

	Y2
	X2M-27
	X2M-26
	Y3
	Y1
	YC

Each wire has a stamp on the end so the installer will know where to land the wire.

NOTE:
Cut off spade terminal before landing wiring to X2M-26

ALARM ON/OFF OUTPUT	X7M	1-2
HEATING/COOLING ON/OFF OUTPUT	X7M	3-4
SOLAR INPUT	X7M	5-6

X7M 1-2 – NO Contacts (max 1 amp 24 VAC)
X7M 3-4 – NO Contacts (max 1 amp 24 VAC)

X7M 5-6 – Connect Solar Pump Station ON signal, 24 VAC present

Solar Priority Mode – EKRP1HB

First code	Second code	Setting name	Default value	Range	Step	Unit
C	Setup on EKRP1HB digital I/O PCB					
	00	Solar priority mode setting	0	0/1	-	-
	01	Alarm output logic	0	0/1	-	-
	02	Bivalent operation status	0	0/1	-	-
	03	Bivalent ON Temperature	32 / 0	-13 ~ 77 / -25 ~ 25	1.8 / 1	˚F / ˚C
	04	Bivalent hysteresis	5.4 / 3	3.6 ~ 18 / 2 ~ 10	1.8 / 1	˚F / ˚C

[C-00] Solar Priority Mode: two different types of solar priority mode operation can be set.

[C-00] = 0 => Solar operation has priority

Solar will operate in case T Solar panel > TDHW solar. In case the solar radiation is weak (slow heat up), Shortage of hot water can occur by high request.

[C-00] = 1 => Heat pump has priority.

Independent of the solar operation status, in case the HP ON temp (T HP ON) is reached the HP will start and solar will be stopped (in case of operation).

Solar Priority Mode – EKRP1HB (cont.)

In case Solar priority ON [C-00] = 0 (default)

- Solar energy available (T_{solar} > DHW T_{SPS} + 50°F/10°C)
  => DHW <u>will</u> be heated by the Solar kit
  => Heat pump will not operate
  => Booster heater will not operate

- Solar energy NOT available (T_{solar} < DHW T_{SPS} + 50°F/10°C)
  => DHW <u>will</u> be heated by the Heat pump and / or Booster heater

<u>Heat pump</u>

& { - DHW $T_{I/U} \leq T_{HP\ ON}$
- Allowed by schedule timer
- Highest demand towards the DHW }

⇒ Heat pump will operate
Primary Operation

<u>Booster heater</u>

& { - DHW $T_{I/U} \leq T_{BH\ ON}$
- Allowed by schedule timer
- Booster heater delay timer over }

⇒ Booster heater will operate
Secondary Operation

Solar Priority Mode – EKRP1HB (cont.)

In case Solar priority OFF [C-00] = 1

- Solar energy available (T_{solar} > DHW T_{SPS} + 50°F/10°C)

=> DHW can be heated by the Solar kit

Heat pump

& - DHW T I/U ≤ THP ON
- Allowed by schedule timer
- Highest demand towards the DHW

⇒ Heat pump will operate

Primary Operation

Booster heater

& - DHW T I/U ≤ TBH ON
- Allowed by schedule timer
- Booster heater delay timer over

⇒ Booster heater will operate

Secondary Operation

Solar

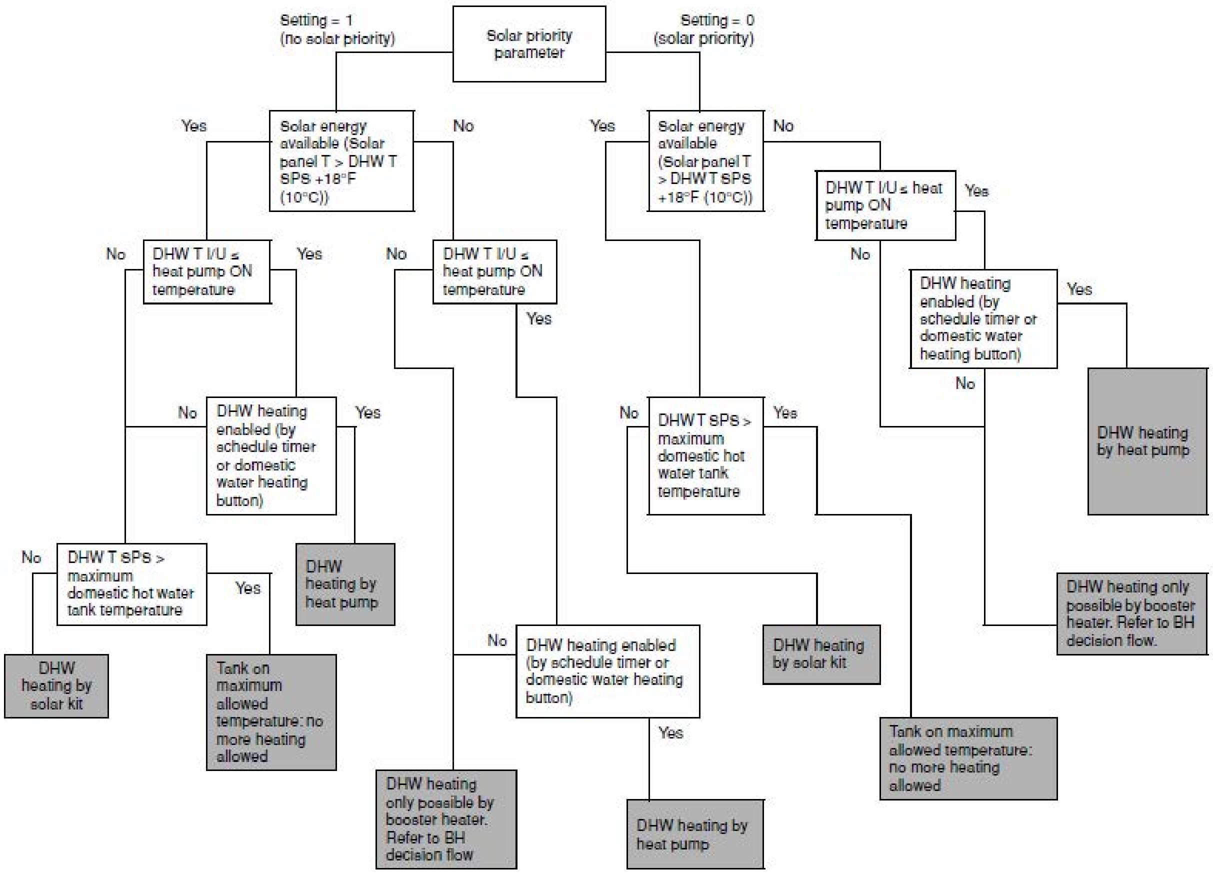
- DHW T I/U > THP ON

⇒ Solar will operate

Tertiary Operation

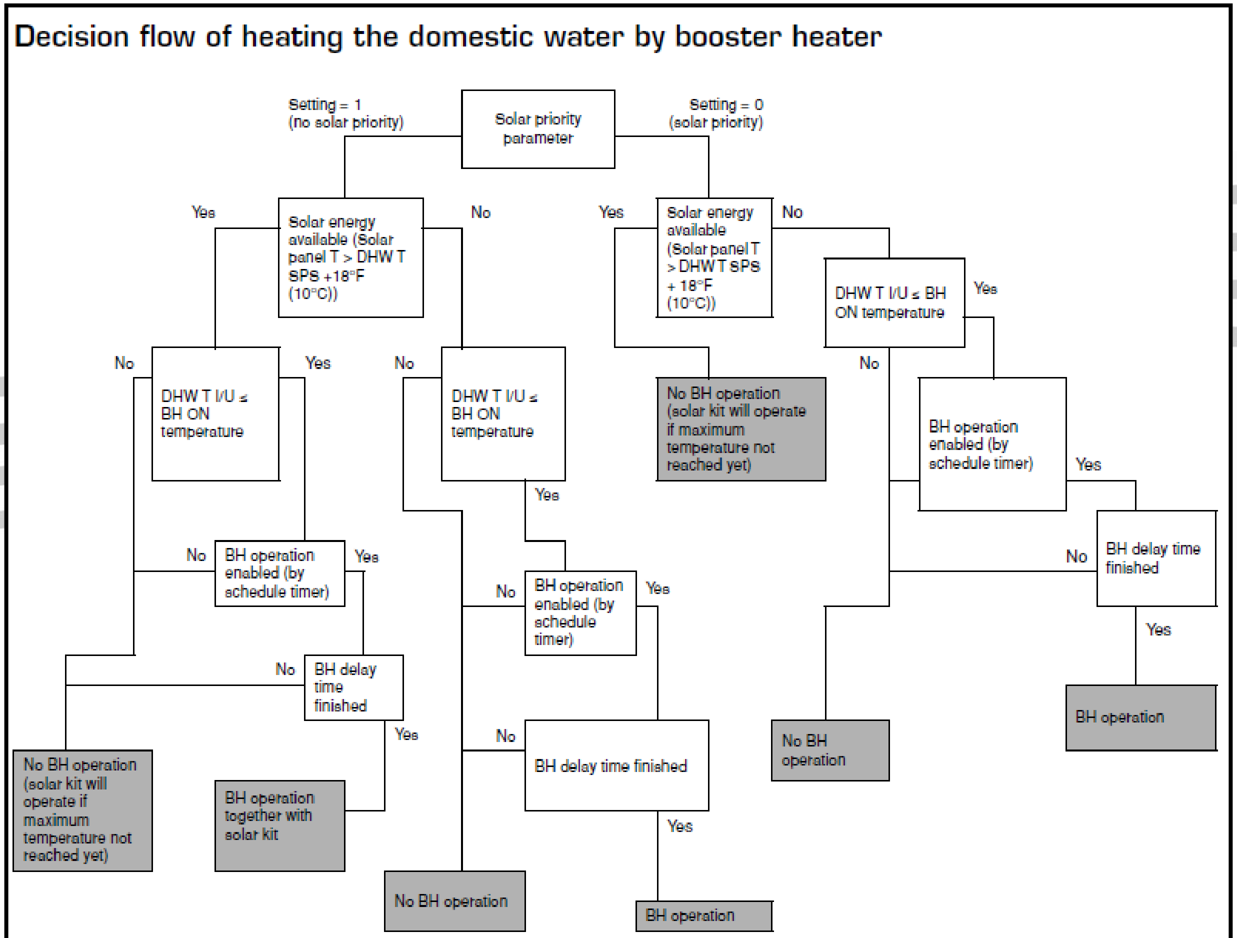
Solar Priority Mode – EKRP1HB (cont.)

Decision flow of heating the domestic water by heat pump or by solar kit



DHW	Domestic Hot Water
DHW T SPS	Domestic Hot Water Temperature by the Solar Pump Station temperature sensor
DHW T I/U	Domestic Hot Water Temperature by the Indoor Unit temperature sensor
BH	Booster Heater

Solar Priority Mode – EKRP1HB (cont.)



DHW	Domestic Hot Water
DHW T SPS	Domestic Hot Water Temperature by the Solar Pump Station temperature sensor
DHW T I/U	Domestic Hot Water Temperature by the Indoor Unit temperature sensor
BH	Booster Heater

Alarm Output Logic (EKRP1HB Option)

First code	Second code	Setting name	Default value	Range	Step	Unit
C	Setup on EKRP1HB digital I/O PCB					
	00	Solar priority mode setting	0	0/1	-	-
	01	Alarm output logic	0	0/1	-	-
	02	Bivalent operation status	0	0/1	-	-
	03	Bivalent ON Temperature	32 / 0	-13 ~ 77 / -25 ~ 25	1.8 / 1	˚F / ˚C
	04	Bivalent hysteresis	5.4 / 3	3.6 ~ 18 / 2 ~ 10	1.8 / 1	˚F / ˚C

[C-01] Alarm output logic: Defines open or closed contacts for notification of alarm.

[C-01]	Alarm	No alarm	No power supply to unit
0 (default)	Closed output	Open output	Open output
1	Open output	Closed output	Open output

DAIKIN altherma

R-410A INVERTER

Bi-Valent Setup (EKRP1HB Option)

First code	Second code	Setting name	Default value	Range	Step	Unit
C	Setup on EKRP1HB digital I/O PCB					
	00	Solar priority mode setting	0	0/1	-	-
	01	Alarm output logic	0	0/1	-	-
	02	Bivalent operation status	0	0/1	-	-
	03	Bivalent ON Temperature	32 / 0	-13 ~ 77 / -25 ~ 25	1.8 / 1	˚F / ˚C
	04	Bivalent hysteresis	5.4 / 3	3.6 ~ 18 / 2 ~ 10	1.8 / 1	˚F / ˚C

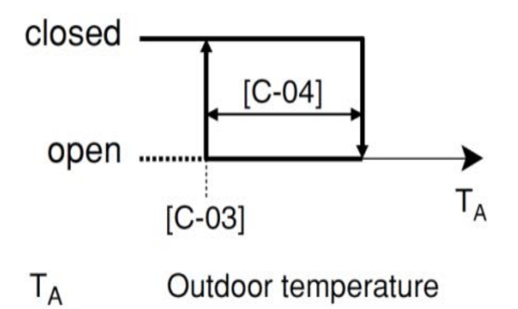
Bi-Valent operation is set up using [C-02] ~ [C-04]

[C-02] Bivalent operation status: defines whether Bi-Valent operation is enabled (1) or disabled (0).

[C-03] Bivalent ON temperature: defines the outdoor temperature below which the permission signal for the auxiliary boiler will be active (closed, KCR on EKRP1HB) and space heating by hydrobox will be stopped.

[C-04] Bivalent hysteresis: defines the temperature difference between bivalent ON temperature and bivalent OFF temperature.

Permission signal X1–X2 (EKRP1HB)



Time of Use Utility Rate Power Supply (Benefit kW)

- When the equipment receives a Time of Use Utility rate power supply signal, the electricity company is allowed to:
  - Interrtupt power supply to the equipment for certain periods of time
  - Demand that the equipment only consumes a limited amount of electricity during certain periods of time
- When the unit is receive this kind of input signal, the unit switches into forced off mode.

Important note!

- MonoBloc applications cannot have main power disconnected, but can allow control of the heaters. Use only Type 1 with MonoBloc.

- If the Time of Use Utility rate power supply is of the type that power supply is not interrupted, the unit will be forced to off. Controlling the solar pump is still possible. When the Time of Use Utility rate signal is sent, the centralized control indicator will flash to indicate that the Time of Use Utility rate is active.

Time of Use Utility Rate Power Supply (Benefit kW) (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
D	Time of Use Utility (Benefit kWh) rate power supply/local shift weather dependent					
	00	Switching off heaters	0	0/1/2/3	-	-
	01	Unit connection to Time of Use Utility rate power supply	0 (OFF)	0/1/2	-	-
	02	Not applicable. Do not change the default value	0	-	-	-
	03	Local shift value weather dependent	0	0/1/2/3/4	-	-

- **HP tariff power supply**
  - **No power to outdoor PCB**
  - **Controlling compressor**
- **Normal power supply**
  - **Indoor PCB**
  - **By activation X40A**
  - **Heaters can still be controlled**
  - **Clock remembered in user interface**

Time of Use Utility Rate Power Supply (Benefit kW) (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
D	Time of Use Utility (Benefit kWh) rate power supply/local shift weather dependent					
	00	Switching off heaters	0	0/1/2/3	-	-
	01	Unit connection to Time of Use Utility rate power supply	0 (OFF)	0/1/2	-	-
	02	Not applicable. Do not change the default value	0	-	-	-
	03	Local shift value weather dependent	0	0/1/2/3/4	-	-

[D-00] : Defines which heaters are switched off when the time of use utility rate signal of the electricity company is received.

Remark: [D-00] settings 1,2 and 3 are only meaningful if the time of use utility rate power supply is of the type that power supply is not interrupted.

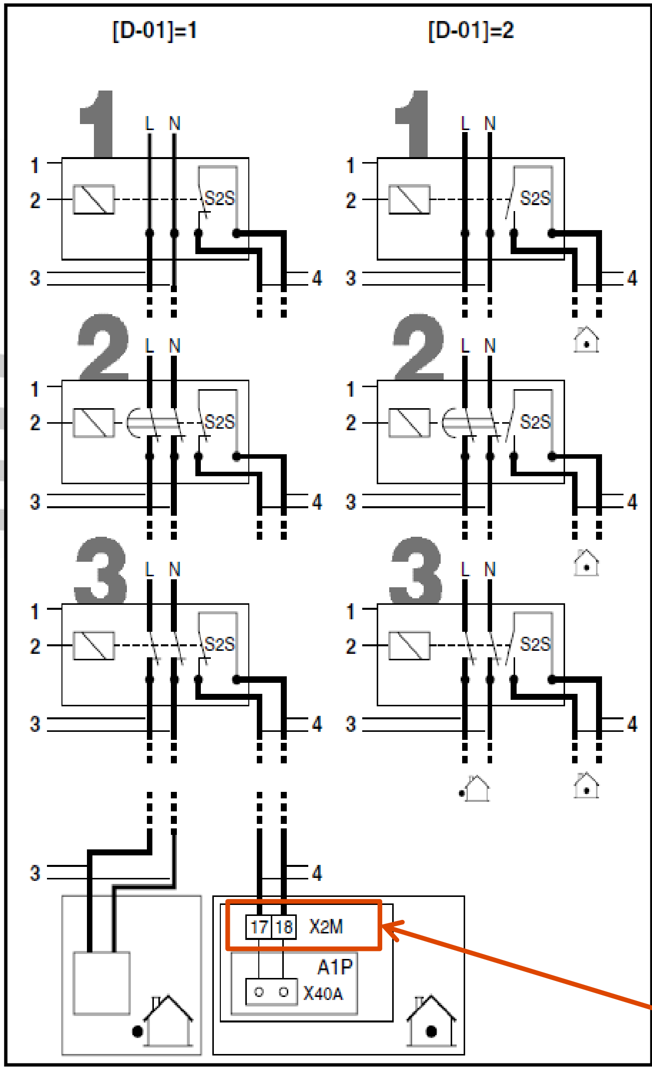
[D-00]	Compressor	Back up heater	Booster heater
0 (default)	Forced off	Forced off	Forced off
1	Forced off	Forced off	Permitted
2	Forced off	Permitted	Forced off
3	Forced off	Permitted	Permitted

Time of Use Utility Rate Power Supply (Benefit kW) (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
D		**Time of Use Utility (Benefit kWh) rate power supply/local shift weather dependent**				
	00	Switching off heaters	0	0/1/2/3	-	-
	01	Unit connection to Time of Use Utility rate power supply	0 (OFF)	0/1/2	-	-
	02	Not applicable. Do not change the default value	0	-	-	-
	03	Local shift value weather dependent	0	0/1/2/3/4	-	-

- **[D-01] = 0 : The unit is connected to the normal power supply (default)**
- **[D-01] = 1 : When the company is sending this time of use utility rate signal, the contact will open and the unit will go in forced off mode.**
- **[D-01] = 2 : When the company is sending this time of use utility rate signal, the contact will close and the unit will go in forced off mode.**

Time of Use Utility Rate Power Supply (Benefit kW) (cont.)



When the outdoor unit is connected to a time of use utility rate power supply, the voltage free contact of the receiver controlling the time of use utility rate signal of the electricity company must be connected to terminals 17 and 18 of X2M.

When parameter [D-01]=1 at the moment that the time of use utility rate signal is sent by the electricity company, that contact will open and the unit will go in forced off mode (1).

When parameter [D-01]=2 at the moment that the time of use utility rate signal is sent by the electricity company, that contact will close and the unit will go in forced off mode (2).

- **type 1**

The time of use utility rate power supply is of the type that power supply is not interrupted.

- **type 2 and 3**

The time of use utility rate power supply is of the type that power supply will be interrupted after elapse of time or is interrupted immediately.

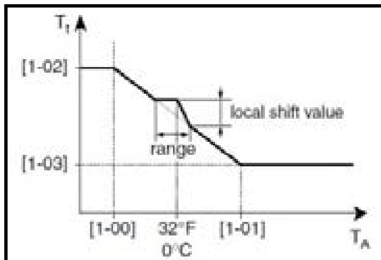
1	Benefit kWh rate power supply box
2	Receiver controlling the signal of the electricity company
3	Power supply to outdoor unit (refer to the installation manual delivered with the outdoor unit)
4	Voltage free contact to indoor unit

Time of Use Utility Rate Power Supply & Outdoor Reset

First code	Second code	Setting name	Default value	Range	Step	Unit
D	Time of Use Utility (Benefit kWh) rate power supply/local shift weather dependent					
	00	Switching off heaters	0	0/1/2/3	-	-
	01	Unit connection to Time of Use Utility rate power supply	0 (OFF)	0/1/2	-	-
	02	Not applicable. Do not change the default value	0	-	-	-
	03	Local shift value weather dependent	0	0/1/2/3/4	-	-

[D-03] Local shift value outdoor reset: determines the shift value of the outdoor reset set point around outdoor temperature of 32°F/0°C

Raising the "T_t" target water temperature be either 3.6° of 7.2°F to offset the scope that at 32°F the outdoor humidity it typically at its highest and higher heating needs may exist.



T_t	Target water temperature
T_A	Outdoor temperature
range	Range
local shift value	Local shift value
[1-00], [1-01], [1-02], [1-03]	Applicable field setting of the weather dependent set point [1]

[D-03]	Outdoor temperature range (T_A)	Local shift value
0	—	—
1	28.4°F~35.6°F −2°C~2°C	3.6°F 2°C
2		7.2°F 4°C
3	24.8°F~39.2°F −4°C~4°C	3.6°F 2°C
4		7.2°F 4°C

- **Remark: Only relevant in case outdoor reset is selected**

Additional Sensors & Software Version

First code	Second code	Setting name	Default value	Range	Step	Unit
E	**Unit information readout**					
	00	Software version	Read only	-	-	-
	01	EEPROM version	Read only	-	-	-
	02	Unit identification	Read only	-	-	-
	03	Liquid refrigerant temperature	Read only	-	-	°F / °C
	04	Inlet water temperature	Read only	-	-	°F / °C

REMARK: [E-03/04]: readouts are not permanently refreshed. temperature readouts are updated after looping through the field setting first codes again. E->F->0->1->…->D->E

See page 56 for how to read; leaving water temperature, outdoor temperature and DHW tank temperature.

Miscellaneous Field Settings

First code	Second code	Setting name	Default value	Range	Step	Unit
F	**Option setup**					
	00	Pump operation	0	0/1	-	-
	01	Space cooling permission temperature	68 / 20	50 ~ 95 / 10 ~ 35	1.8 / 1	˚F / ˚C
	02	Bottom plate heater ON temperature	37.4 / 3	37.4 ~ 50 / 3 ~ 10	1.8 / 1	˚F / ˚C
	03	Bottom plate heater hysteresis	9 / 5	3.6 ~ 9 / 2 ~ 5	1.8 / 1	˚F / ˚C
	04	Functionality of X14A	1	0/1	-	-

[F-00] Pump operation: specifies whether the pump operation function is enabled (1) or disabled (0).

- **[F-00] = 0 :** pump OFF T_A > [4-02] (heating mode**)**
- **[F-00] = 0 :** pump OFF T_A < [F-01] (cooling mode)
- **[F-00] = 1 :** pump sampling
- **Purpose for this new setting:** sampling operation can increase the yearly running cost.

Miscellaneous Field Settings (cont.)

First code	Second code	Setting name	Default value	Range	Step	Unit
F	Option setup					
	00	Pump operation	0	0/1	-	-
	01	Space cooling permission temperature	68 / 20	50 ~ 95 / 10 ~ 35	1.8 / 1	˚F / ˚C
	02	Bottom plate heater ON temperature	37.4 / 3	37.4 ~ 50 / 3 ~ 10	1.8 / 1	˚F / ˚C
	03	Bottom plate heater hysteresis	9 / 5	3.6 ~ 9 / 2 ~ 5	1.8 / 1	˚F / ˚C
	04	Functionality of X14A	1	0/1	-	-

[F-01] Space cooling permission temperature: defines the outdoor temperature below which space cooling is turned off.

[F-02] Bottom plate heater ON temperature: defines the outdoor temperature below which the bottom plate heater will be activated by hydrobox in order to prevent ice build-up in the bottom plate of the outdoor unit at lower outdoor temperatures.

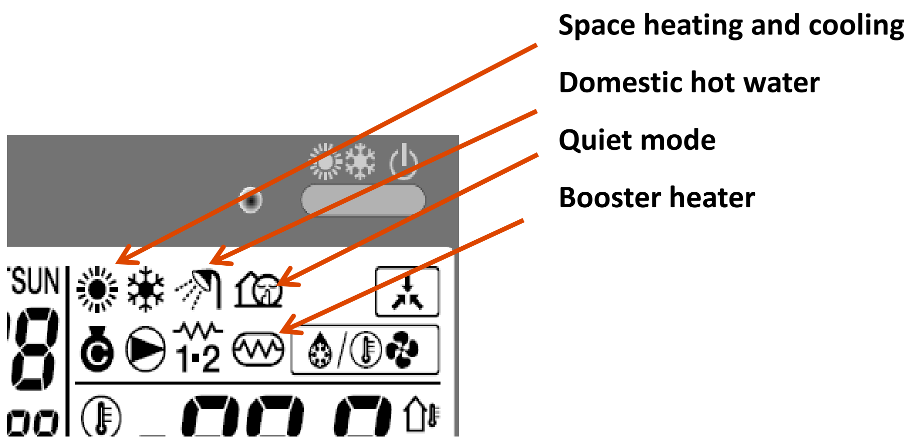
[F-03] Bottom plate hysteresis: defines the temperature difference between bottom plate heater ON temperature and the bottom plate heater OFF temperature.

[F-04] Functionality of X14A: specifies if the logic of X14A follows the output signal for the solar kit model or if the logic of X14A follows the output for the bottom plate heater.

Schedule Timer Overview

What can I program with the Schedule Timer?

There are 4 possible operations to program:



If DSS-3 is turned ON, external control present. No scheduling of Heating or Cooling is allowed. This must be done at the local zone control.

Schedule Timer Overview (cont.)

Schedule timer operation

In schedule timer operation, the installation is controlled by the schedule timer. The actions programmed in the schedule timer will be executed automatically. The schedule timer always follows the last command until a new command is given. This means that the user can temporarily overrule the last executed programmed command by manual operation (Refer to "Manual operation" on page 6). The schedule timer will regain control over the installation as soon as the next programmed command of the schedule timer occurs. The schedule timer is enabled (icon displayed) or disabled (icon not displayed), by pressing the button.

- Only use the button to enable or disable the schedule timer. The schedule timer overrules the button. The button only overrules the schedule timer until the next programmed action.
- If the auto restart function is disabled, the schedule timer will not be activated when power returns to the unit after a power supply failure. Press the button to enable the schedule timer again.
- When power returns after a power supply failure, the auto restart function reapplies the user interface settings at the time of the power supply failure. It is therefore recommended to leave the auto restart function enabled.

- The programmed schedule is time driven. Therefore, it is essential to set the clock and the day of the week correctly.
- Manually adjust the clock for summertime and wintertime.
- A power failure exceeding 2 hours will reset the clock and the day of the week. The schedule timer will continue operation, but with a disordered clock. The clock and the day of the week will need to be reset.
- The actions programmed in the schedule timer will not be lost after a power failure so that reprogramming the schedule timer is not required.

Schedule Timer Overview (cont.)

What can the schedule timer do?

The schedule timer allows the programming of:

1. Space heating and space cooling (refer to "Programming space heating or space cooling" on page 221) Switch on the desired mode at a scheduled time, in combination with a set point (weather dependent or manually set). Five actions per weekday can be programmed, totaling 35 actions.

Note: When the unit is connected to an external room thermostat, the schedule timer for space heating and space cooling is overruled by the external room thermostat.

2. Quiet mode (refer to "Programming quiet mode, booster heating or domestic water heating" on page 224) Switch the mode on or off at a scheduled time. Five actions can be programmed per mode. These actions are repeated daily.
3. Booster heating (refer to "Programming quiet mode, booster heating or domestic water heating" on page 224) Allow or disallow booster heating at a scheduled time. Five actions can be programmed per mode. These actions are repeated daily.
4. Domestic water heating (refer to "Programming quiet mode, booster heating or domestic water heating" on page 224) Switch the mode on or off at a scheduled time. Five actions can be programmed per mode. These actions are repeated daily.
    - The programmed actions are not stored according to their timing but according to the time of programming. This means that the action that was programmed first gets action number 1, even though it is executed after other programmed action numbers.
    - When the schedule timer switches space heating or space cooling OFF, the controller will also be switched off. Note that this has no influence on domestic water heating.

Schedule Timer Overview (cont.)

What can the schedule timer NOT do?

The schedule timer can not change the operation mode from space cooling to space heating or vice versa.

How to interpret the programmed actions

To be able to understand the behavior of your installation when the schedule timer is enabled, it is important to keep in mind that the "last" programmed command overruled the "preceding" programmed command and will remain active until the "next" programmed command occurs.

Example: imagine the actual time is 17:30 and actions are programmed at 13:00, 16:00 and 19:00. The "last" programmed command (16:00) overruled the "previous" programmed command (13:00) and will remain active until the "next" programmed command (19:00) occurs.

So in order to know the actual setting, one should consult the last programmed command. It is clear that the "last" programmed command may date from the day before. Refer to "Consulting programmed actions" on page 226.

During schedule timer operation, someone may have altered the actual settings manually (in other words, the "last" command was overruled manually). The icon ⌚, indicating the schedule timer operation, may still be displayed, giving the impression that the "last" command settings are still active. The "next" programmed command will overrule the altered settings and return to the original program.

Programming the Schedule Timer

Programming and consulting the schedule timer

Getting started

Programming the schedule timer is flexible (you can add, remove or alter programmed actions whenever required) and straightforward (programming steps are limited to a minimum). However, before programming the schedule timer, remember:

- Familiarize yourself with the icons and the buttons. You will need them when programming. Refer to "Name and function of buttons and icons" on page 42 ~ 45.
- Fill out the form included in Operation Manual. This form can help you define the required actions or each day. Keep in mind that:
  - In the space heating/cooling program, 5 actions can be programmed per weekday. The same actions are repeated on a weekly basis.
  - In the domestic water heating, booster heater and quiet mode program, 5 actions can be programmed per mode. The same actions are repeated on a daily basis.
- Take your time to enter all data accurately.
- Try to program the actions in a chronological way: start with action 1 for the first action and end with the highest number for the last action. This is not a requirement but will simplify the interpretation of the program later.
- If 2 or more actions are programmed for the same day and at the same time, only the action with the highest action number will be executed.
- You can always alter, add or remove the programmed actions later.

Continued on next page

Programming the Schedule Timer (cont.)

- When programming heating actions (time and set point), cooling actions are added automatically at the same time but with the predefined default cooling set point. Conversely, when programming cooling actions (time and set point), heating actions are added automatically at the same time but with the default heating set point.

The set points of these automatically added actions can be adjusted by programming the corresponding mode. This means that after programming heating, you should also program the corresponding cooling set points and vice versa.

Due to the fact that the schedule timer cannot switch between operation modes (heating or cooling) and the fact that each programmed action implies a heating set point and a cooling set point, the following situations may occur:

- when the schedule timer is active in heating mode, and the mode is changed manually to cooling (by means of the button), the operation mode will from then on remain cooling and program actions will follow the corresponding cooling set points. Returning to heating mode needs to be carried out manually (by means of the button).
- when the schedule timer is active in cooling mode, and the mode is changed manually to heating (by means of the button), the operation mode will from then on remain heating and program actions will follow the corresponding heating set points. Returning to cooling mode needs to be carried out manually (by means of the button).

The above proves the importance of programming both cooling and heating set points for each action. If you do not program these set points, the predefined default values will be used.

R-410A
INVERTER

Programming the Schedule Timer (cont.)

Programming space heating or space cooling

Programming space heating or space cooling is carried out as follows:

Note: Returning to previous steps in the programming procedure without saving modified settings is done by pressing the button.

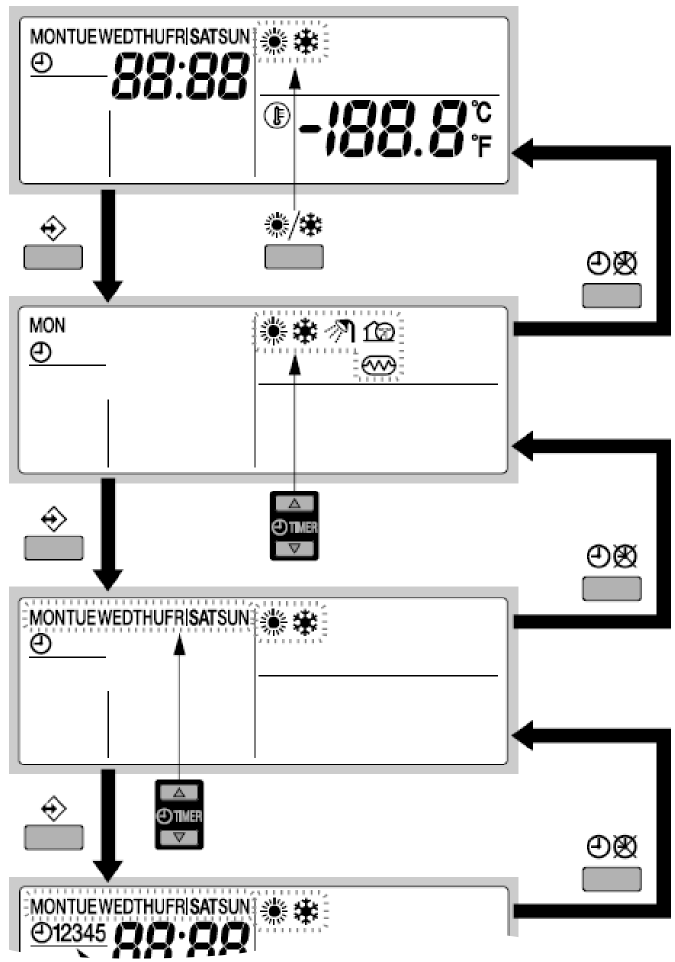
1. Use the button to select the operation mode (cooling or heating) you want to program.

2. Press the button. The actual mode is blinking.

3 Press the button to confirm the selected mode. The actual day is blinking.

4. Select the day you would like to consult or to program by means of the buttons. The selected day is blinking.

5. Press the button to confirm the selected day. The first programmed action of the selected day appears.



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Programming the Schedule Timer (cont.)

6. Use the buttons to consult the other programmed actions of that day. This is called the readout mode. Empty program actions (e.g. 4 and 5) are not displayed.

7. Press the button for 5 seconds to enter the programming mode.

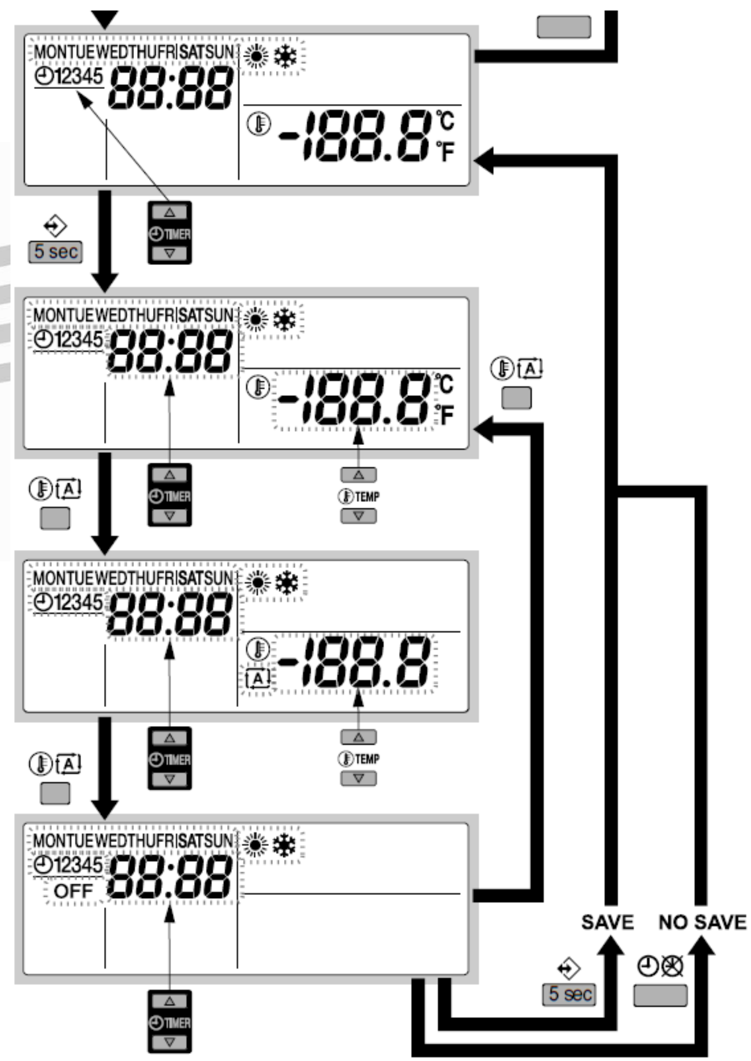
8. Use the button to select the action number you would like to program or to modify.

9. Use the button to select:
   - OFF to switch heating or cooling and the controller off.
   - -88.8 set the temperature by means of the buttons.
   - [A] to select automatic temperature calculation (only in heating mode).

10. Use the buttons to set the correct action time.

11. Repeat steps 8 to 10 to program the other actions of the selected day. When all actions have been programmed, make sure that the display shows the highest action number you would like to save.

Continued on next page



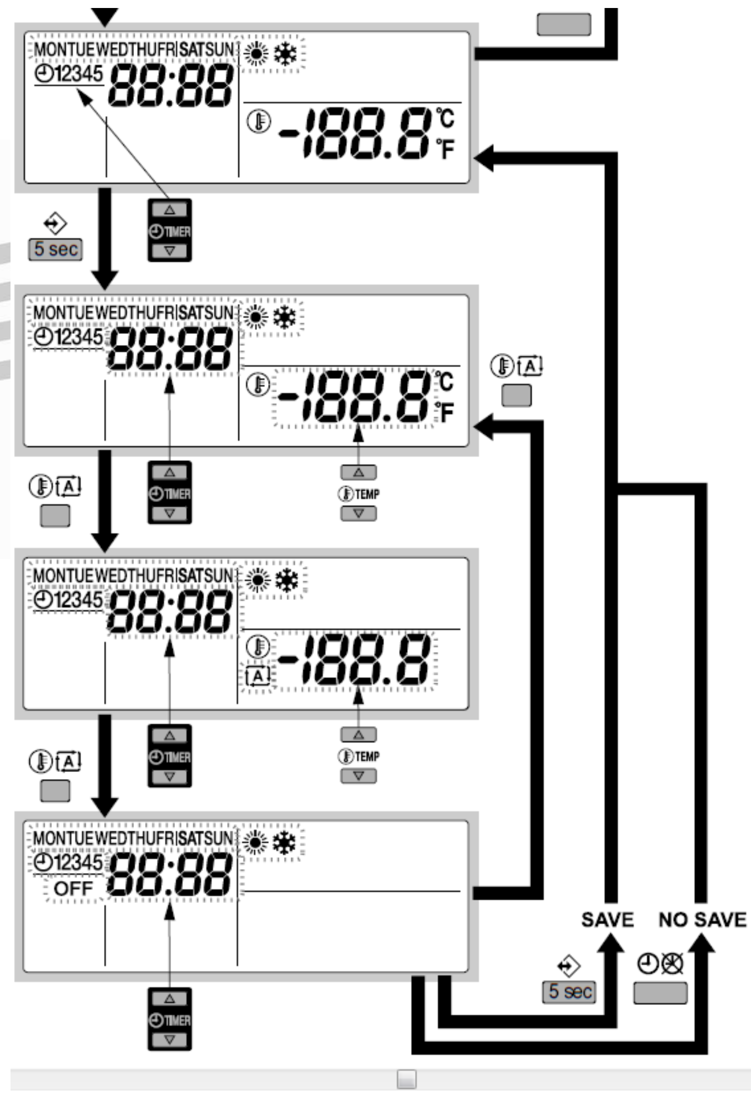
Programming the Schedule Timer (cont.)

12. Press the button for 5 seconds to store the programmed actions.

If the button is pressed when action number 3 is displayed, actions 1, 2 and 3 are stored but 4 and 5 are deleted.

You automatically return to step 6.

By pressing the button several times, you return to previous steps in this procedure and finally return to normal operation.



Programming space heating or space cooling are both done in the same way. At the start of the programming procedure space heating or space cooling is selected. After that, you have to return to the start of the programming procedure to program the other operation mode.

Programming the Schedule Timer (cont.)

Programming quiet mode, booster heating or domestic water heating

Programming domestic water heating, booster heater or quiet mode is carried out as follows:

Note: Returning to previous steps in the programming procedure without saving modified settings is done by pressing the button.

1. Press the button. The actual mode is blinking.
2. Use the buttons to select the mode you want to program (quiet mode , booster heating or domestic water heating).The selected mode is blinking.
3. Press the button to confirm the selected mode. The first programmed action is displayed.
4. Use the buttons to consult the programmed actions. This is called the readout mode. Empty program actions (e.g. 4 and 5) are not displayed.

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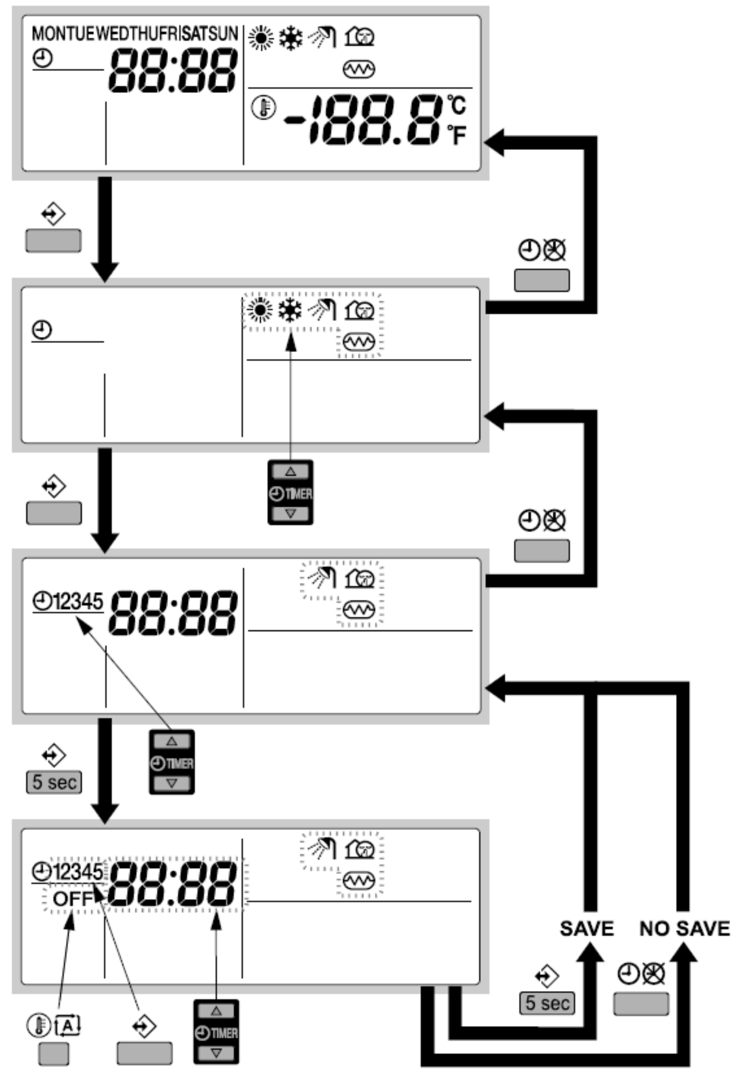


Programming the Schedule Timer (cont.)

5. Press the button for 5 seconds to enter the programming mode.

6. Use the button to select the action number you would like to program or to modify.

7. Use the buttons to set the correct action time.

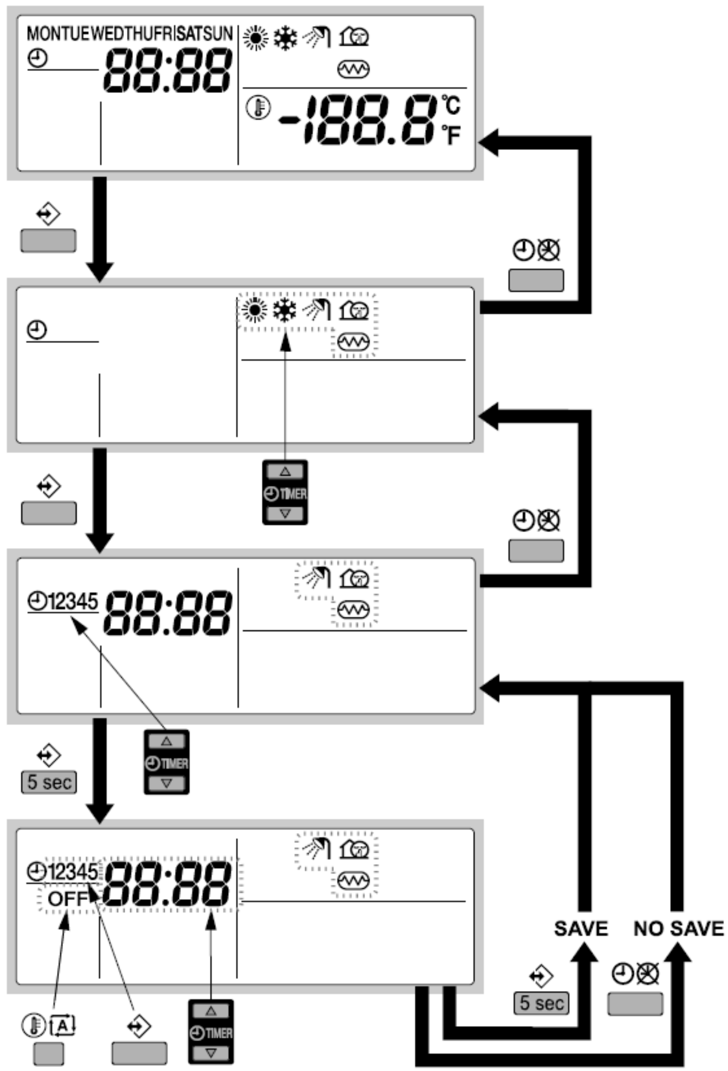
8. Use the button to select or deselect OFF as action.

9. Repeat steps 6 to 8 to program the other actions of the selected mode. When all actions have been programmed, make sure that the display shows the highest action number you would like to save.

10. Press the button for 5 seconds to store the programmed actions.

If the button is pressed when action number 3 is displayed, actions 1, 2 and 3 are stored but 4 and 5 are deleted.

You automatically return to step 4. By pressing the button several times, you return to previous steps in this procedure and finally return to normal operation.



Programming the Schedule Timer (cont.)

Consulting programmed actions

Consulting space heating or space cooling actions

Consulting space heating or space cooling is done in the same way. At the start of the consulting procedure space heating or space cooling is selected. After that, you have to return to the start of the consulting procedure to consult the other operation mode.

Consulting space heating or space cooling is carried out as follows.

Returning to previous steps in this procedure is done by pressing the button.

1. **Use the button to select the operation mode (cooling or heating) you want to consult.**
2. **Press the button. – The actual mode is blinking.**
3. **Press the button to confirm the selected mode. – The actual day is blinking.**
4. **Select the day you would like to consult by means of the buttons. – The selected day is blinking.**
5. **Press the button to confirm the selected day. The first programmed action of the selected day appears.**
6. **Use the buttons to consult the other programmed actions of that day.**

This is called the readout mode. Empty program actions (e.g. 4 and 5) are not displayed.

By pressing the button several times, you return to previous steps in this procedure and finally return to normal operation.

Programming the Schedule Timer (cont.)

Consulting domestic water heating, booster heater or quiet mode

Consulting domestic water heating, booster heater or quiet mode is carried out as follows.

Returning to previous steps in this procedure is done by pressing the button.

1. Press the button. – The actual mode is blinking.
2. Use the buttons to select the mode you want to consult (quiet mode , booster heating or domestic water heating). – The selected mode is blinking.
3. Press the button to confirm the selected mode. The first programmed action is displayed.
4. Use the buttons to consult the programmed actions.

This is called the readout mode. Empty program actions (e.g. 4 and 5) are not displayed.

By pressing the button several times, you return to previous steps in this procedure and finally return to normal operation.

Programming the Schedule Timer (cont.)

Tips and tricks

Programming the next day(s)

After confirming the programmed actions of a specific day (i.e. after pressing the button for 5 seconds), press the button once. You can now select another day by using the buttons and restart consulting and programming.

Copying programmed actions to next day

In heating/cooling program it is possible to copy all programmed actions of a specific day to the next day (e.g. copy all programmed actions from MON to TUE).

To copy programmed actions to the next day, proceed as follows:

1. Press the button. – The actual mode is blinking.
2. Use the buttons to select the mode you want to program. – The selected mode is blinking.

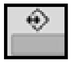
You can leave programming by pressing the button.

3. Press the button to confirm the selected mode. – The actual day is blinking.
4. Select the day you would like to copy to the next day by means of the buttons. The selected day is blinking.

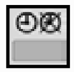
You can return to step 2 by pressing the button.

Continued on next page

Programming the Schedule Timer (cont.)

5. Press the  and  buttons simultaneously for 5 seconds.

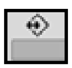
After 5 seconds the display will show the next day (e.g. “TUE" if “MON" was selected first) This indicates that the day has been copied.

You can return to step 2 by pressing the  button.

Deleting one or more programmed actions

Deleting one or more programmed actions is done at the same time as storing the programmed actions.

When all actions for one day have been programmed, make sure that the display shows the highest action number you would like to save. By pressing the  button for 5 seconds, you store all actions except those with a higher action number than the one that is displayed.

E.g. when the  button is pressed when action number 3 is displayed, actions 1, 2 and 3 are stored but 4 and 5 are deleted.

Continued on next page

Programming the Schedule Timer (cont.)

Deleting a mode

1. Press the button. The actual mode is blinking.
2. Use the buttons to select the mode you want to delete (quiet modes , booster heating or domestic water heating). The selected mode is blinking.
3. Press the and button simultaneously for 5 seconds to delete the selected mode.

Deleting a day of the week (heating or cooling mode)

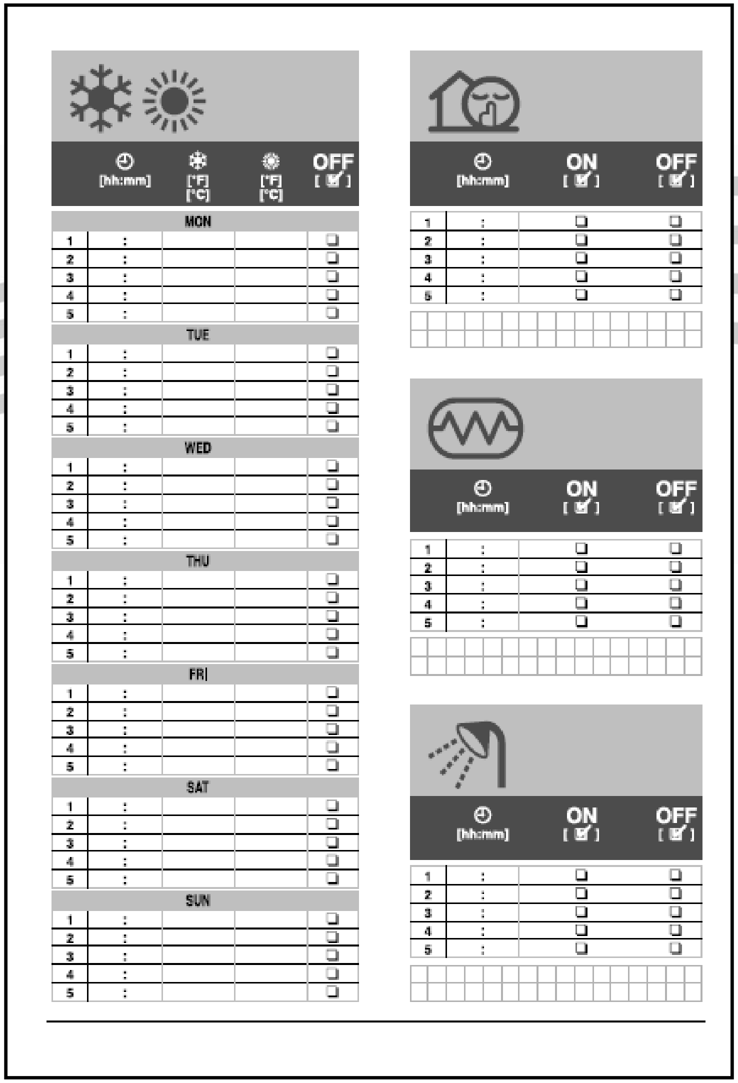
1. Use the button to select the operation mode (cooling or heating) you want to delete.
2. Press the button. The actual mode is blinking.
3. Press the button to confirm the selected mode. The actual day is blinking.
4. Select the day you would like to delete by means of the buttons. The selected day is blinking.
5. Press the and button simultaneously for 5 seconds to delete the selected day.

Programming the Schedule Timer (cont.)

Schedule Timer Worksheet

This page is located within the Operation Manual for the Hydrobox and Monobloc.

Use this sheet to help layout your schedule prior to programming the user interface.



	[hh:mm]	[°F] [°C]	[°F] [°C]	OFF [✓]
MON				
1	:			☐
2	:			☐
3	:			☐
4	:			☐
5	:			☐
TUE				
1	:			☐
2	:			☐
3	:			☐
4	:			☐
5	:			☐
WED				
1	:			☐
2	:			☐
3	:			☐
4	:			☐
5	:			☐
THU				
1	:			☐
2	:			☐
3	:			☐
4	:			☐
5	:			☐
FRI				
1	:			☐
2	:			☐
3	:			☐
4	:			☐
5	:			☐
SAT				
1	:			☐
2	:			☐
3	:			☐
4	:			☐
5	:			☐
SUN				
1	:			☐
2	:			☐
3	:			☐
4	:			☐
5	:			☐

	[hh:mm]	ON [✓]	OFF [✓]
1	:	☐	☐
2	:	☐	☐
3	:	☐	☐
4	:	☐	☐
5	:	☐	☐

	[hh:mm]	ON [✓]	OFF [✓]
1	:	☐	☐
2	:	☐	☐
3	:	☐	☐
4	:	☐	☐
5	:	☐	☐

	[hh:mm]	ON [✓]	OFF [✓]
1	:	☐	☐
2	:	☐	☐
3	:	☐	☐
4	:	☐	☐
5	:	☐	☐

Emergency Heating/Cooling Setting on the Outdoor Unit

Large Split & MonoBloc only

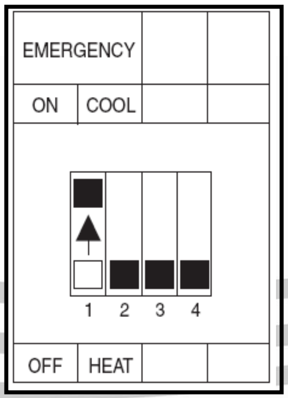
The outdoor unit can be forced to run in heating/cooling operation by change the dipswitch SS1 on the outdoor PCB (A1P)

The table below describes the purpose of the forced operation mode.

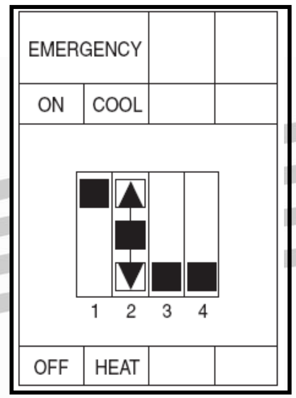
If…	Then…
• R/C is defective • Hydraulic compartment PC board is defective • Compressor compartment PC board is defective	Forced operating mode can be used to go to cooling or heating. In forced operating mode, the compressor is forced to operate until the defective indoor or outdoor PC board is back online.

Emergency Heating/Cooling Setting on the Outdoor Unit (cont.)

Turn OFF power of the outdoor unit.



Change dipswitch SS1-1 to "ON"



Change dipswitch SS1-2 to "Heat" or "Cool"

Turn ON power of the outdoor unit after settings are made.

Check the pump operation at the hydrobox. Pump must operate!!!!

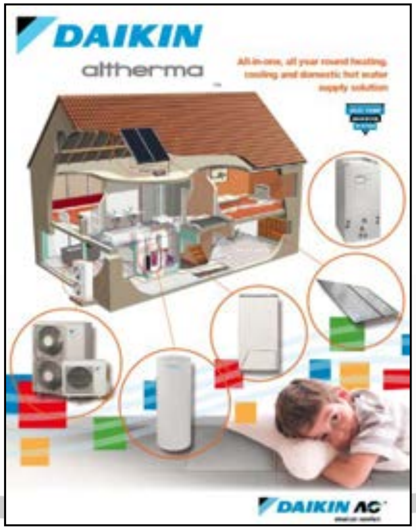
Active Components

Component	Forced cooling	Forced heating	Forced defrosting
Compressor	ON	ON	ON
4-way valve	OFF	ON	OFF
Fan	H fan speed	H fan speed	OFF
Pump	ON	ON	ON

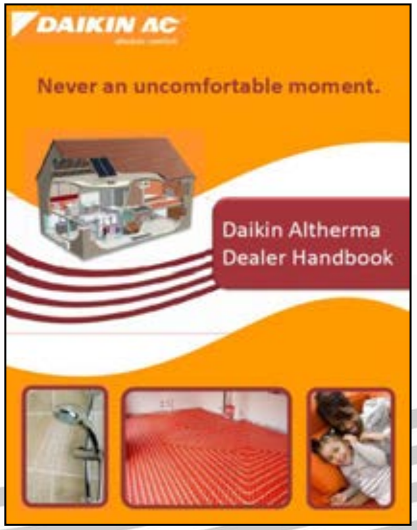
Tech Field Notes:

More Daikin Altherma Publications and Tools

Literature



Dealer Handbook

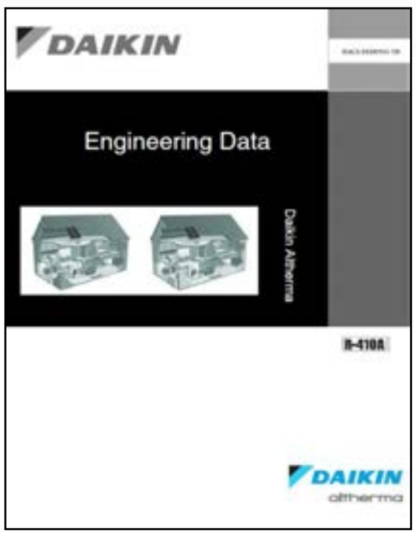


FAQs

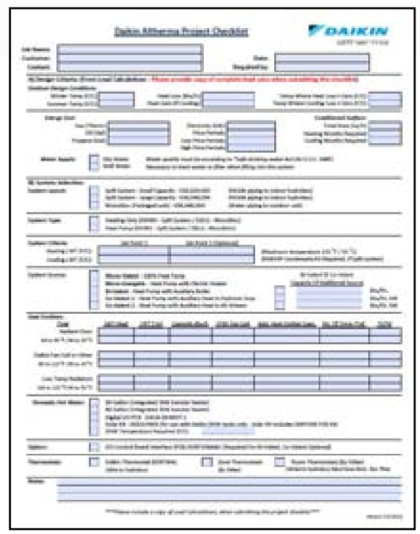
Maintenance Checklists

Service Manuals

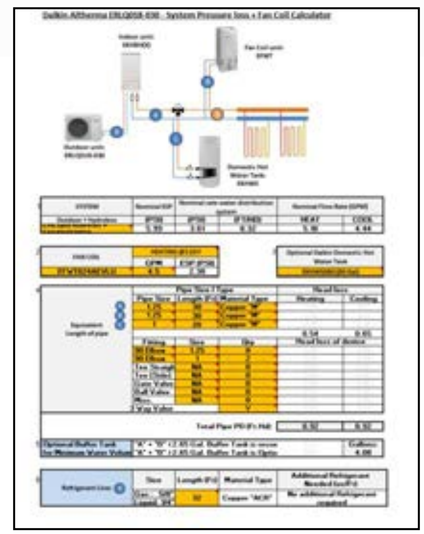
Engineering Data



Project Checklists



Flow Verification Tools



For more detailed information check out Daikin's Engineering, Installation, Operation and Service manuals.
Available at www.daikinac.com

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Carrollton, Texas, 75006
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Web: www.daikinac.com

DAIKIN AC
absolute comfort

Daikin Altherma
Frequently Asked Questions

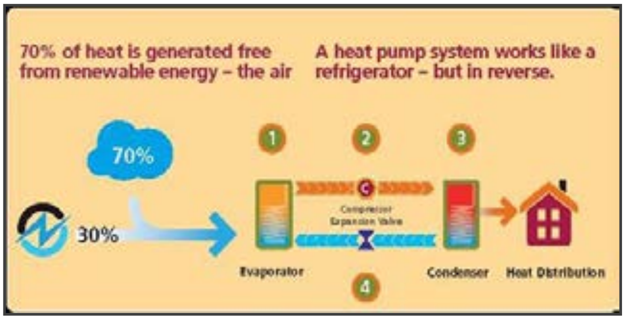
a “3 in 1” Renewable Energy Solution For Home Heating, Cooling and Domestic Hot Water

Space Heating, Domestic Hot Water, and Cooling

WHERE DOES IT ALL START?

A heat pump only needs a heat source (the outside air), two heat exchangers (one to absorb and another one to release heat) and a relatively small amount of drive energy to keep the system going.

A heat pump extracts thermal energy from the environment. In the case of Daikin Altherma, the source is outside air. The pump extracts the energy at a certain temperature, increases that temperature, and then releases it into the water running to your low temperature radiators, located under the floor's heating system or fan coil units. Between those two media, the heat is moved through refrigerant (R-410A). Daikin Altherma is an air-to-water heat pump system.



WHAT IS HYDRONIC HEATING?

The heat that is "loaded" onto the hydronic loop at the heat source, carried to where it's needed by the water flowing through piping, and then "unloaded" at one or more heat emitters. Within this simplified general concept are thousands of options that allow hydronic heating systems to be tailored to your exact needs.

WHY USE A HYDRONIC SYSTEM?

Hydronic heating and cooling systems offer many benefits These include:

- Superior Comfort
- Unobtrusive Installation
- Design Flexibility
- Clean Operation
- Quiet Operation
- Zoning ability
- Energy Efficiency

WHY CHOOSE A HEAT PUMP?

The latest energy saving and carbon reduction legislation means that there is now more emphasis than ever to reduce our reliance on fossil fuels and adopt more sustainable, renewable energy solutions.

HOW DOES A HEAT PUMP WORK?

- A heat exchanger contains refrigerant, which is colder than the outside air. As the air passes the exchanger, the refrigerant absorbs the latent heat from the outside air and evaporates.
- The vapor passes into the compressor and is compressed, increasing its pressure and temperature, effectively concentrating the heat.
- Hot vapor is condensed in the second heat exchanger where heat is rejected and the vapor condenses back into a liquid. The rejected heat passes into the central heating and hot water system, ready for use in the home.
- The liquid refrigerant passes back through an expansion valve, ready to start the cycle again.

WHAT IS DAIKIN ALTHERMA?

Daikin Altherma is an innovative system that acts like a boiler to heat a closed loop of water but can even cool water. This water can then be utilized in radiant loops, fan coil unit or radiators to provide cooling and heating to the home. Adding domestic hot water (DHW) storage tank will also allow Daikin Altherma to be your source for your DHW needs.

WHAT IS THE LOWER OPERATION LIMIT TEMPERATURE FOR THE DAIKIN ALTHERMA SYSTEM?

The guaranteed operation limit is up to 5°F (-15C) for small Split Systems and -4°F (-20C) for large Split Systems.

IS THE HOT WATER FUNCTION ALWAYS INCLUDED?

Yes, but you need a Daikin hot water tank to make it operational. The Daikin DHW tank option also includes a 3-way diverting valve.

IS THE COOLING FUNCTION ALWAYS INCLUDED?

No, the cooling function is an option available only on the reversible versions of the Hydrobox model numbers EKHBX030 and EKHBX054, and EBLQ036, 048 & 054 Monobloc.

WHAT TYPE OF SYSTEM OPTIONS EXIST?

There are two specified systems: the **Split System** and the Monobloc System. The Split system is a combination of outdoor unit, Hydrobox (Indoor), and optional DHW tank. The **Monobloc** (package) system is a combines of outdoor, Hydrobox sections, and optional DHW tank.

IS IT POSSIBLE TO COMBINE DAIKIN ALTHERMA WITH SOLAR THERMAL TUBES FOR DOMESTIC HOT WATER HEATING?

Yes, Daikin offers an integrated solar connection kit. The Solar Kit model number: EKSOLHWAVJU. This kit includes the Digital I/O PCB model number: EKRP1HBAAU.

CAN I CONNECT RADIATORS TO THE DAIKIN ALTHERMA SYSTEM EVEN THOUGH THE TEMPERATURE IS LIMITED AT 131°F (55°C)?

Yes, Daikin Altherma can be connected to radiators. In many cases, old radiators that are sized for 158°F (70°C) are heavily oversized and can also be used with a water temperature of 131°F (55°C) or lower.

CAN FAN COIL UNITS AND FLOOR HEATING BE COMBINED IN THE SAME SYSTEM?

Yes, but the leaving water temperature must then be adjusted to match the temperature requirement for the fan coil units. The temperature in the floor loops must be reduced to a suitable level by the use of a mixing valve or shunt connection. The heat pump capacity and COP will decrease with increasing water temperatures.
(Refer to Installation Instructions, field setting #7, for dual setpoint control status.) Daikin only offers a dual setpoint control function. With this function two setpoints can be generated. Depending on the required water temperature (floor heating loops and/or fan coil units are required) the first or second setpoints can be activated.

CAN I COMBINE THE DAIKIN ALTHERMA WITH MY EXISTING TRADITIONAL HEATING SYSTEM?

Existing dwellings that are already equipped with traditional gas, electric or fuel boilers can be combined with Altherma systems in a variety of scenarios including 100% backup.

DAIKIN altherma

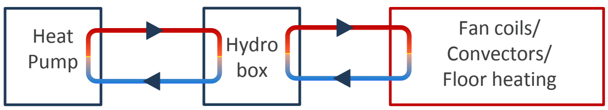
Split system

Package system "Monobloc"

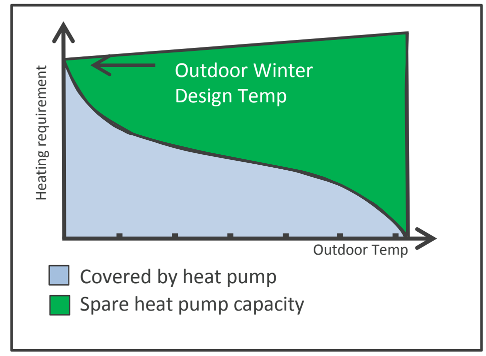
WHAT ARE THE DIFFERENT WAYS DAIKIN ALTHERMA CAN BE CONFIGURED?

There are many different possible configurations for the Altherma system.

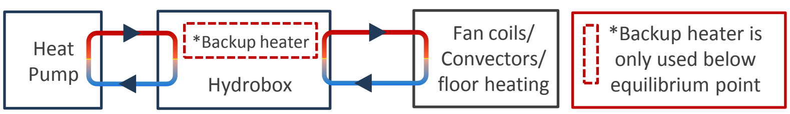
1. **Monovalent** (Mild Climate):



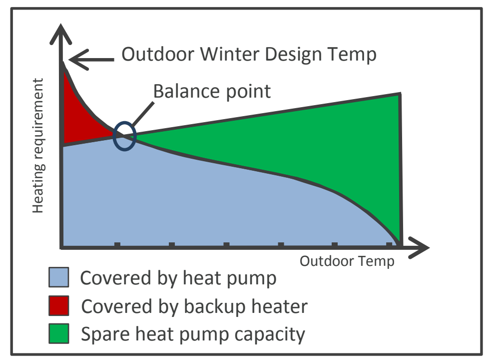
- Uses heat pump energy only
- 100% heat pump coverage: higher investment cost heat pump



2. **Monoenergetic** (Cold Climate):

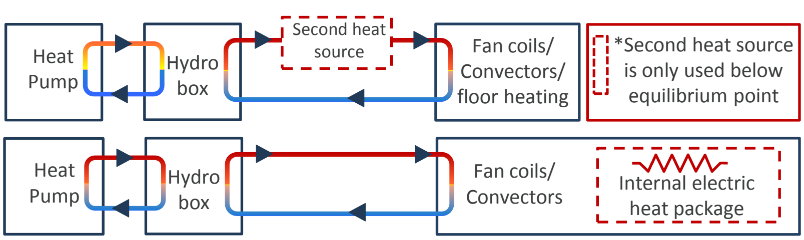


- Uses heat pump energy with backup electric heater
- Best balance between investment cost and running costs

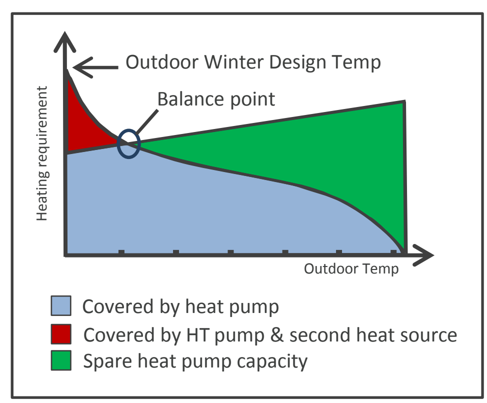


3. **Covalent** (Mild-Ultra Cold Climate):

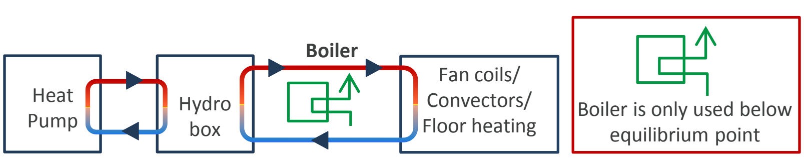
Option 1: Auxiliary Heat in Hydronic Loop
Option 2: Auxiliary Heat in Air Stream (could be Gas or Fuel Heating Solution)
Second heat source is only used below equilibrium point



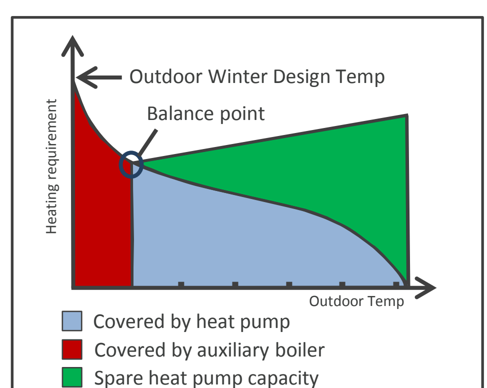
- Utilization of heat pump with combination of the Optional second heat source (Electric, Oil or Gas Boiler) for Mild-Ultra cold climate heating days



4. **Bivalent** (Ultra-Cold Climate):



- Utilization of heat pump then switching over to alternative heat source like Boiler for Ultra cold climate heating days



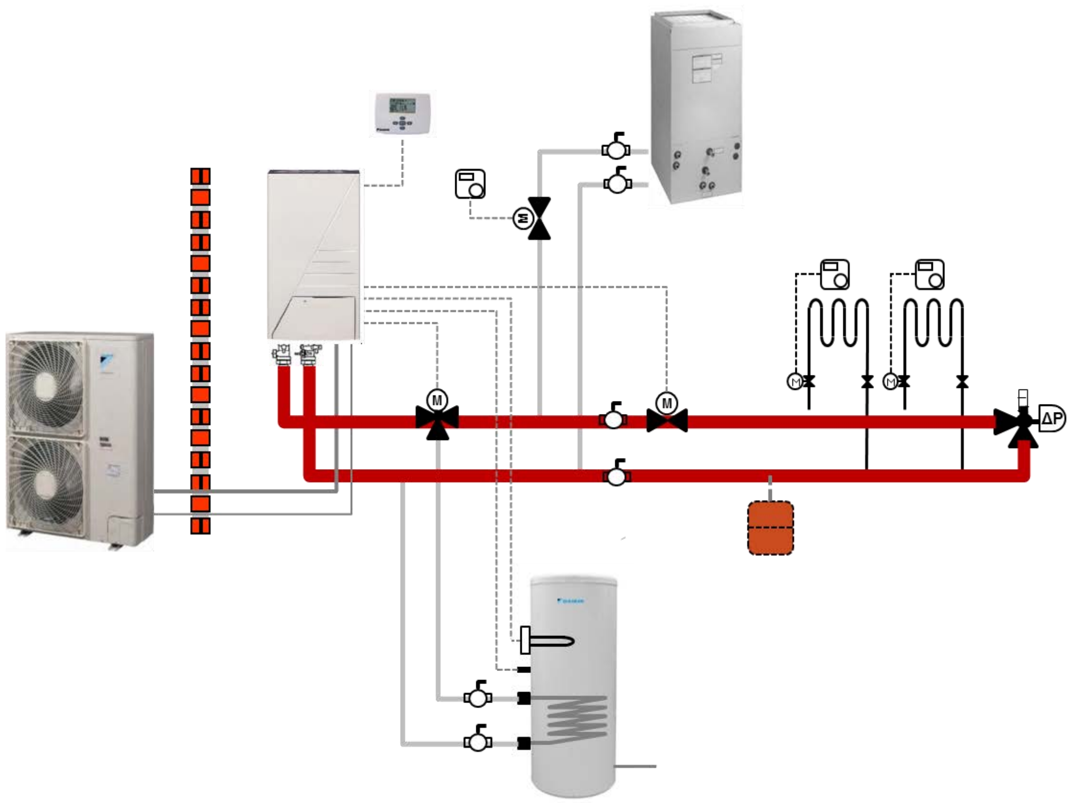
CAN ALTHERMA PRODUCE HOT WATER IN SUMMER?
Yes, Daikin Altherma can run in hot water mode up to an ambient temperature of 95ºF (35ºC). The heating and cooling version alternate between hot water mode and cooling mode. At outside temperatures exceeding 95ºF (35ºC), hot water can still be produced using the booster heater, or through Solar if integrated to a solar thermal solution.

WHAT IS THE MINIMUM WATER CONTENT OF THE SYSTEM?
- 2.6 gallons (10 liters) for sizes: 018-030
- 5.3 gallons (20 liters) for sizes: 036-054

Are minimum water volume for the systems. This volume excludes the volume of the heat emitters selected.

WHY IS THERE A MINIMUM WATER VOLUME IN THE HYDRONIC SYSTEM?
The minimum water volume is to ensure complete defrost cycles and to eliminate short cycling of the outdoor unit. This allows for efficient and reliable system operation. Do not include the water volume from the Hydrobox in the system minimum water volume.

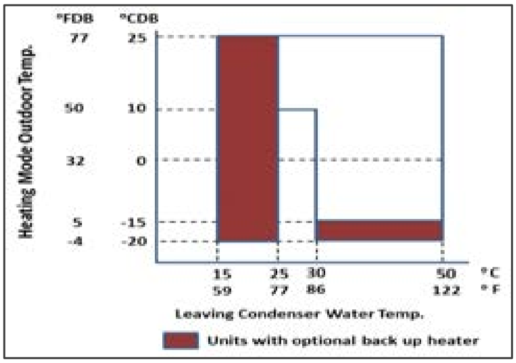
IS THERE A NEED FOR AN ADDITIONAL BUFFER TANK TO ENSURE THAT THE WATER TEMPERATURE DOES NOT DROP DURING DEFROST?
It is not necessarily required, the backup heater will provide the necessary heating capacity if the water temperature drops below 59ºF (15ºC). In specific applications where a buffer tank is requested, It can be implemented in the hydronic system.

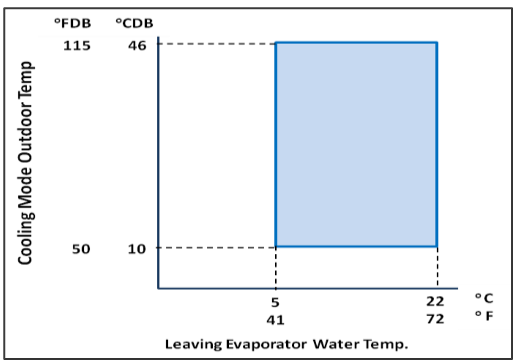


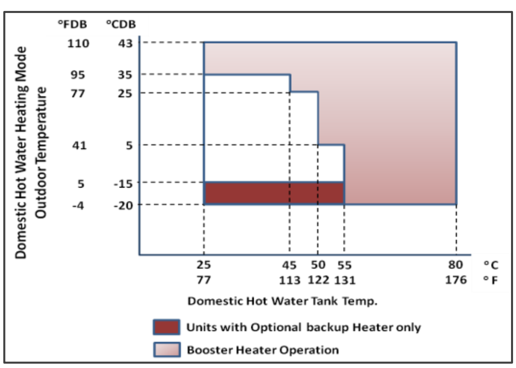
Minimum Water Volume:
2.6 gallons (10 liters) for sizes: 018-030
5.3 gallons (20 liters) for sizes: 036-054

WHAT IS THE DAIKIN ALTHERMA SYSTEM OPERATING RANGE?

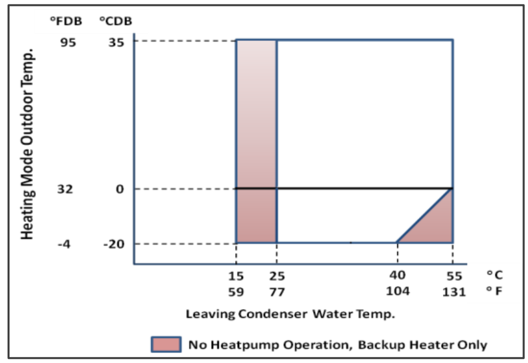
The operating range for 018-030 is displayed in the following figure:

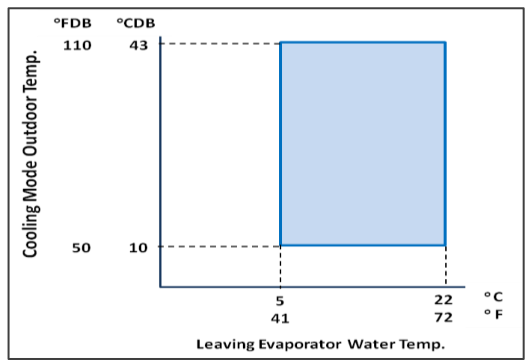


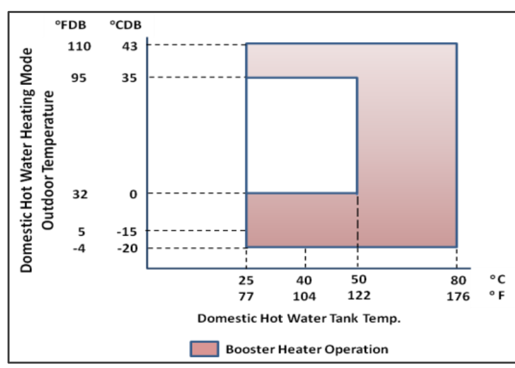




The operating range for 036-054 is displayed in the following figure:







WHAT IF MY HYDRONIC CIRCUIT FLOW IS GREATER THAN THE MAXIMUM FLOW THROUGH DAIKIN ALTHERMA?

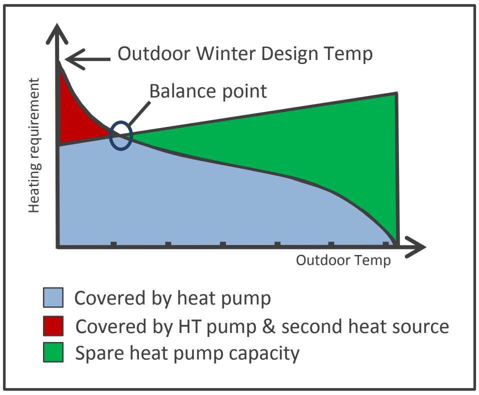
A primary/secondary piping configuration will have to be used by incorporating closely spaced tees or a hydro separator. Water flow through the Altherma Hydrobox should not exceed its maximum rating.

WHAT SIZE FUSES DO I NEED FOR THE OUTDOOR UNIT POWER SUPPLY?

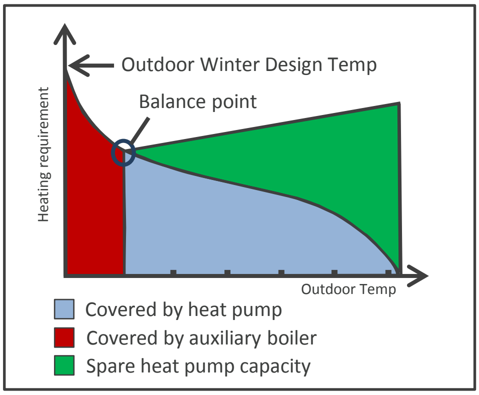
For (ERLQ) split type sizes 018-030 use 20 Amp breaker and sizes 036-054 use 30 Amp breaker. For (EBLQ & EDLQ) Monobloc type sizes 036-054 use 30 Amp breaker. Refer to the Installation Manual for instructions and conform to local code.

CAN I INTEGRATE A DAIKIN ALTHERMA SYSTEM TO AN EXISTING HEATING/HOT WATER SOLUTION?
Yes, both Covalent and Bivalent application is ideal for refurbishment/upgrade installations. See details in the following diagram:

Covalent (Mild-Ultra Cold Climate):



Bivalent (Ultra-Cold Climate):



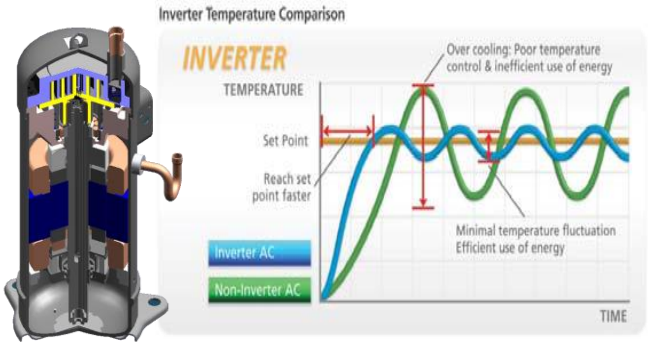
CAN BOTH HEAT SOURCES OPERATE SIMULTANEOUSLY IN A BIVALENT APPLICATION?
No, only one heating solution (boiler) or Altherma can operate at a time, when using the Bivalent configuration.

CAN I COOL THE SPACE BY USING UNDER-FLOOR COOLING?
Radiant cooling can be effective if utilized correctly. Climate, application humidity, and condensation are very important considerations during design.

HOW DOES THE COMPRESSOR OPERATE IN HOT WATER MODE?
The compressor ramps up to the highest frequency, but controls to maximize heat transfer to water.

WHAT ARE THE OPERATION HEATING-SUPPLY WATER TEMPERATURES FOR ALTHERMA?
Typical values are:
- Floor heating: 86°to 95°F / 30°to 35°C
- Fan Coil Units: 86°to 113°F / 30°to 45°C
- Low temperature radiators: 104°to 122°F/40°to 50°C

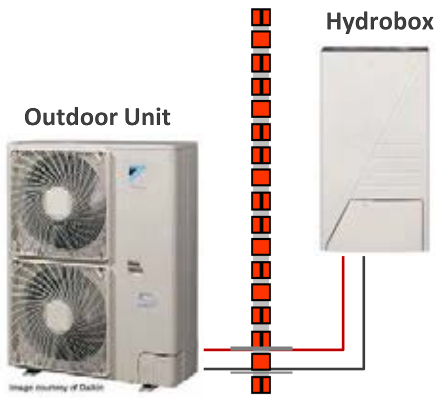
WHAT IS AN INVERTER COMPRESSOR?
An inverter compressor gradually increases or decreases its capacity based on the requirement to cool down or heat up the water.



WHAT ARE THE BENEFITS OF INVERTER COMPRESSOR?
- Longer Run Periods at Lower Capacities.
- Better Dehumidification.
- Fewer compressor starts mean less wear and tear on the compressor = **Longer life!**
- Lower compressor speeds = **Higher operating efficiency!**
- Condenser coil surface remains large in relation to reduced capacity = **Enhanced efficiency!**
- Higher efficiency = **Lower electric bills!**

WHAT IS A HYDROBOX?

The Hydrobox unit is the indoor part of Altherma split system range and consists of two main versions: a heating /cooling (EKHBX) version and a heating only (EKHBH) version. Both versions are delivered with an integrated backup heater for additional heating capacity during cold outdoor temperatures. The backup heater also serves as a backup in case of malfunctioning of the outdoor unit. The backup heater models are available for a heating capacity of 3 and 6 kW. The Monobloc has the Hydrobox incorporated with the outdoor unit and is only available with a 6kW backup heater.



HOW DOES THE HYDROBOX WORK?

The Hydrobox heats the water that circulates through low temperature radiators, floor heating systems, or fan coil units and also provides domestic hot water. If you opt for the combination of heating and cooling, then the Hydrobox can also reverse the cycle to provide lower water temperatures and thus cooling to the home.

CAN I CONNECT A MINI-SPLIT OUTDOOR UNIT TO A HYDROBOX?

No. The RA type mini-split condensing units are not configured to operate with a Hydrobox. The PCBs in these condensing units are configured for DX operation only and do not incorporate the parameters for water heating and cooling.

WHAT IS A BACKUP HEATER?

The backup heater provides supplementary space heating capacity in addition to the heat pump in severe weather conditions.

WHERE IS THE BACKUP HEATER LOCATED?

The backup heater is inside the Hydronic section of the Altherma. All the circulating water passes through the heat exchanger and then through the backup heater cylinder.

WILL THE BACKUP HEATER ALWAYS BE SWITCHED ON?

No, the backup heater will only switch ON if the heat pump cannot reach the leaving water setpoint temperature within a certain time period. When the setpoint is reached, the backup heater switches OFF again.

CAN DAIKIN ALTHERMA BE DELIVERED WITHOUT A BACKUP HEATER?

No. The backup heater must be installed to ensure that the water temperature never drops below 59°F (15°C) during startup of the system or during defrost. It can be disengaged for normal operation if needed.

IS IT POSSIBLE TO UPGRADE A LOW CAPACITY BACKUP HEATER TO A LARGER CAPACITY?

No. A larger capacity backup heater is not available, but 3kW and 6kW (2 stage) backup heaters are available.

CAN I UPGRADE A HEATING-ONLY VERSION OF THE HYDROBOX TO A REVERSIBLE HYDROBOX WITH COOLING?

No. There is a software difference between the two models

WHY IS THE WATER TEMPERATURE LIMITED TO 131° F (55°C) EVEN THOUGH I AM USING AN ELECTRIC BACK UP HEATER?

The return water temperature to the heat pump is limited to 131°F (55°C). A return water temperature above will activate a safety device and the compressor frequency will decrease.

WILL THE BACKUP HEATER AND BOOSTER HEATER WORK SIMULTANEOUSLY ?
The backup heater is never operational in heat pump hot-water mode. Both heaters can be operational if the backup heater is running and the booster heater ON temperature is reached. The simultaneous operation of the backup heater and booster can be prevented by a field setting.

IS THERE ANY WIRING BETWEEN THE HYDROBOX AND DOMESTIC TANK ?
Yes. Refer to the Installation Manual.

ARE THERE SEPARATE POWER SUPPLIES FOR THE ELECTRIC HEATERS AND THE OUTDOOR UNIT?
Yes. Refer to the Installation Manual.

IS IT POSSIBLE TO REMOTE MOUNT THE HYDROBOX INTERFACE CONTROLLER?
In the installation instructions, remote locate up to 1640 feet (500 m). The Monobloc requires the installation of interface controller, can be installed up to 1640 feet (500 m).

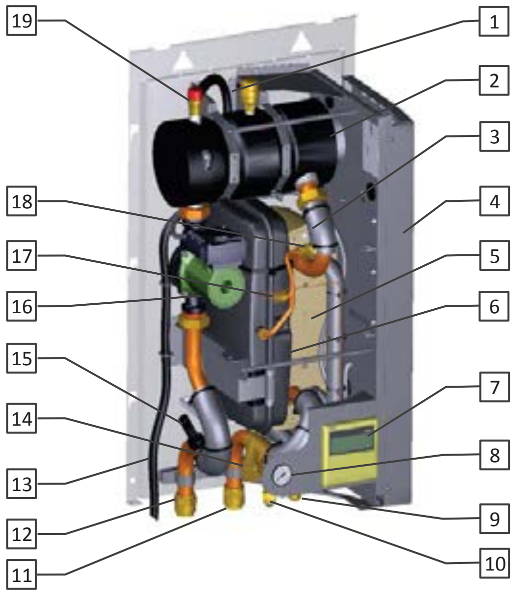
IS IT POSSIBLE TO INSTALL THE HYDROBOX OUTSIDE?
No. The Hydrobox installation location must be frost-free. Temperatures should range between 33ºF (1ºC) to 95ºF (35ºC). The Hydrobox is not agency certified for outdoor installation.

CAN I FLOOR-MOUNT THE HYDROBOX ?
No, the water, refrigerant and electrical connections are all at the bottom of the Hydrobox. A minimum of 45.27 inches (1150mm) from the floor to the bottom of the hydro-box is required for access to these connections. This height requirement makes it difficult to store items on the top of the Hydrobox, which could block the ventilation holes. The Hydrobox is designed for wall-mounted installation only.

WHAT MATERIAL IS USED FOR THE BRAZED PLATE HEAT EXCHANGER LOCATED IN THE HYDROBOX ?
The braze plate heat exchanger is made of cupro-nickel material for efficient heat transfer and corrosion resistance.

WHAT TYPE OF EXPANSION TANK IS SUPPLIED IN THE HYDROBOX ?
A bladder type of 2.6 gal (10 L) volume is provided in the Hydrobox and comes pre-charged at 14.5 psi (1 bar) with dry nitrogen. Nitrogen molecules are larger than air and therefore less likely to penetrate through the internal bladder in the expansion.

HOW MANY VERSIONS ARE AVAILABLE FOR THE HYDROBOX ?
Available in two versions: EKHBH for heating only, EKHBX for heating and cooling

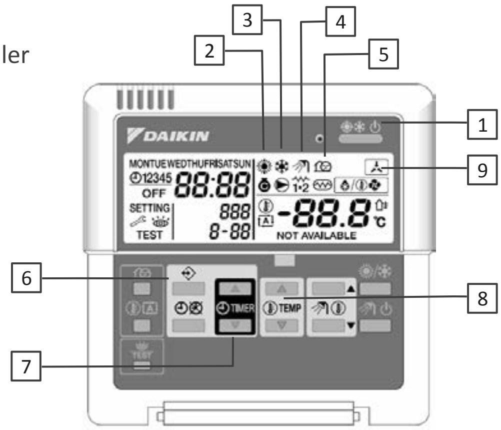


1. Air purge valve
2. Back up Heater
3. Temperature Sensors
4. Electrical Box
5. Braze Plate Heat Exchanger
6. Expansion Vessel (2.6G / 10l)
7. User Interface
8. Water Pressure Gauge
9. Refrigerant Liquid Pipe Connection
10. Refrigerant Gas Pipe Connection
11. Water Inlet Connection
12. Water Outlet Connection
13. Drain
14. Water Filter
15. Flow Switch
16. Pump (Multi Speed)
17. Back Up Heater Thermal protector
18. Back Up Heater Thermal Fuse
19. Pressure Relief Valve

WHAT FUNCTIONS ARE ON THE USER INTERFACE?

WHAT ARE THE MAIN OPERATION FUNCTIONS ON THE CONTROLLER?
The controller has several levels, and many settings are set by the installer during commissioning. The main user settings are:

1. ON/OFF
2. Space heating operation
3. Space cooling operation
4. Water heating operation
5. Silent mode operation
6. Programming Buttons
7. Timer Adjust Buttons
8. Water Temperature Adjust Buttons
9. External Control Icon



WHAT IS THE SCHEDULE TIMER?
The schedule timer allows the user to set the operation of the system according to a daily or weekly program.
• Switch ON/OFF the installation at a scheduled time, in combination with a setpoint temperature for a space heating/cooling program.
• Switch ON/OFF the installation at a scheduled time for a water heating program, booster heater program, or silent mode program.

CAN I USE SEPARATE ROOM THERMOSTATS AND PROGRAMMABLE TIMERS?
Yes, separate controls can be used to adjust room temperatures and will notify the Daikin Altherma system when the room requires heating/cooling. Daikin Altherma will then operate to deliver the set leaving water temperature.

WHAT IS THE EQUILIBRIUM POINT?
It is the point at which the heat pump performance most closely matches the heating demand and no additional heat source is required. This is also known as the thermal balance point.

WHAT IS THE AUTO RESTART FUNCTION?
The Auto Restart function reapplies the user interface settings when the power returns after a supply failure.

WHAT HAPPENS TO THE SCHEDULE TIMER IF THE CLOCK IS RESET?
The schedule timer will continue operation but the clock needs to be reset to reflect the actual time.

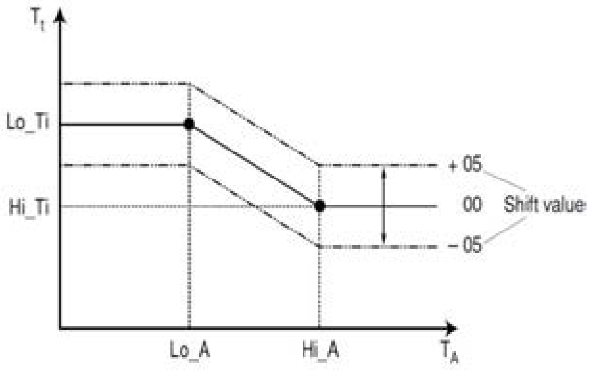
WHAT HAPPENS TO THE CLOCK WHEN A POWER SUPPLY FAILURE OCCURS?
A power failure exceeding one hour will reset the clock.

WHICH OPERATIONAL MODE HAS PRIORITY?
Domestic hot water mode always has priority unless affected by anti-recycle time, field setting [8-02]

WHAT IS THE DIFFERENCE BETWEEN THE EQUILIBRIUM BALANCE POINT (THERMAL BALANCE POINT) AND ECONOMICAL BALANCE POINT?
The thermal balance point is the outside temperature at which the amount of heating provided by Daikin Altherma equals the amount of heat lost from the house at setpoint. At this point, Daikin Altherma capacity matches the full heating needs of the house.

The economic balance point is the outside temperature at which the cost of heat energy supplied by Daikin Altherma equals the cost of heat supplied by a supplementary heating system. In most cases the thermal balance point will be reached long before the economic balance point on a properly working Daikin Altherma system.

WHAT IS THE WEATHER-DEPENDENT SETPOINT AND WHEN SHOULD IT BE USED?
The weather dependent setpoint or sometimes called outdoor reset, is when Daikin Altherma senses the outside temperature and readjusts the heating system water to a minimum water temperature in order to satisfy the heat loss of the home. This accomplishes two major things: one, it will save energy and two it creates more comfort by eliminating short cycling of Daikin Altherma at mild outdoor temperatures. During weather dependent operation, the user has the option to shift up or down the target water temperature by a maximum of 9°F (5°C).



WHAT ARE THE BENEFITS OF A WEATHER DEPENDENT SETPOINT?
The floating setpoint ensures that the heat emitter temperature is never higher than necessary and this leads to the highest possible comfort level. A heat pump requires more energy input the higher the water temperature, meaning that the floating setpoint also ensures the lowest possible energy consumption.

WHAT HAPPENS TO THE WEATHER-DEPENDENT SETPOINT IF THE SUN SHINES OF THE TEMPERATURE SENSOR?
The setpoint might deviate and give a lower water temperature than is actually needed. It is recommended to install some type of sun protection above the outdoor unit.

CAN THE TEMPERATURE SENSOR THAT IS USED TO DETERMINE THE WEATHER-DEPENDENT SETPONT BE MOUNTED REMOTELY FROM THE OUTDOOR UNIT?
No. The sensor is calibrated to a certain resistance and changing the wire length impacts this calibration.

HOW DO I KNOW WHERE THE EQUILIBRIUM POINT IS?
The equilibrium point is not a fixed point. The backup heater switches ON if the heat pump cannot reach the setpoint water temperature within a certain time period independently of the ambient temperature, as long as the backup heat operation is not disabled by the field setting.

WHAT IS A WEATHER DEPENDENT SETPOINT (OUTDOOR RESET)?
When the weather-dependent setpoint functionality is enabled, the setpoint for the leaving water temperature will be dependent upon the outside ambient temperature. At low outside ambient temperatures, the leaving water temperature increases to satisfy the increasing heating requirement of the building. At warmer temperatures, the leaving water temperature decreases to save energy.

CAN I USE THE WEATHER-DEPENDENT SETPOINT IF I INSTALL MY OUTDOOR UNIT IN A GARAGE THAT IS WARMER THAN THE AMBIENT OUTDOOR TEMPERATURE?
No, the floating setpoint is dependent on the temperature sensor in the outdoor unit. If the outdoor unit is installed in a warm place, a fixed setpoint temperature must be applied.

DO I HAVE TO USE A ROOM THERMOSTAT CONNECTED TO THE HYDROBOX?
Even though Daikin Altherma operates without an external thermostat, Daikin highly recommends this feature to be included. This will prevent excessive space heating and save energy since the system will stop operating when the room temperature has the thermostat setpoint.

DO I HAVE TO USE A DAIKIN THERMOSTAT?
No, third party thermostats are acceptable.

WHY DOESN'T THE BOOSTER HEATER SWITCH ON IMMEDIATELY WHEN THERE IS A REQUEST FOR HOT WATER?
It is desirable to let the heat pump cover as much of the hot water production load as possible with high COP. The booster heater delay ensures that the booster heater is not used more than necessary.

WILL I STILL HAVE SUFFICIENT CAPACITY OF HOT WATER EVEN IF THE HEAT PUMP OR BOOSTER HEATER DOES NOT SWITCH TO HOT WATER MODE IMMEDIATELY?
Yes. Daikin Altherma is not based on instant water heating like a gas boiler. The tank has a storage volume of 50 or 80 gallons (200 or 300 liters) of hot water that covers the load while the system switches to hot water mode.

WHY IS THE DHW TANK HEAT EXCHANGER VOLUME AND SURFACE AREA SMALLER THAN TYPICAL INDIRECT WATER HEATERS?
The heat exchanger is designed to optimize heat transfer for both heat pump and solar operation and takes into account Daikin inverter compressor technology allowing higher heat pump capacities at lower outdoor ambient conditions. The DHW tank heat exchanger volume is 1.8 gal/6.8 l and surface area is 15.6 ft2/1.45 m2.

WHAT MATERIAL IS USED FOR THE DHW TANK?
DHW tank is stainless steel 316L. The DHW tank uses 1.57 inch (40mm) thick polyurethane foam insulation which keeps standby heat losses to a maximum of 0.5°F/0.3°C per hour.

CAN I USE A THIRD PARTY DHW TANK INSTEAD OF THE DAIKIN ALTHERMA DHW TANK?
Yes, a third party tank can be used for increased storage capacity and where double wall heat exchangers are required. (Refer to the Engineering Data book for third party DHW tank kit information.)

WHAT ARE THE DHW RECOVERY CHARACTERISTICS?
On average, 55 minutes without booster heater. See chart below for details (recovery times based on 80°F/44.5°C ΔT):
Daikin Altherma DHW Recovery Times (minutes)

Capacity BTUH	Recovery Times (minutes)	
	50gal (220L)	80gal (300L)
(018) 18,000	111	178
(024) 24,000	83	133
(030) 30,000	67	107
(036) 36,000	56	89
(048) 48,000	42	67
(054) 54,000	37	59

Recovery times based on 80°F/44.5°C Δ T
Booster heater delay default setting is minimum 20 minutes (Maximum is 95 minutes)

CAN I INTEGRATE DAIKIN ALTHERMA DHW WITH SOLAR COLLECTOR?
The solar kit integrates the field-supplied solar thermal panels with the pump station and domestic hot water tank.

The solar kit provides the transfer of solar heat to the Daikin Altherma hot water tank via an external heat exchanger. In contrast to tanks with two heat exchangers, this system allows the entire content of the tank to be efficiently heated with solar heat and, if necessary, with heat pump energy.

EKSOLH
solar kit

EKHWS
Hot water tank

ARE THERE ANY REFRIGERANT PIPING LIMITATIONS?

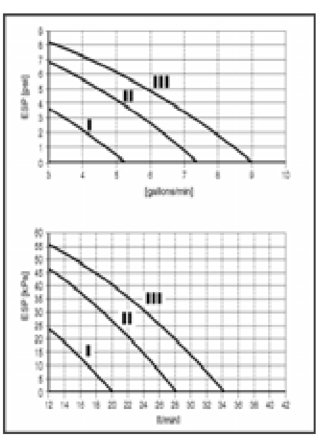
Yes, see following list:

REQUIREMENT	018-030	036-054
Maximum allowable refrigerant piping length between outdoor unit and indoor unit.	98.4ft (30m)	246ft (75m)
Minimum required refrigerant piping length between outdoor unit and indoor unit.	(a) 9.8ft (3m)	(a) 9.8ft (3m)
Maximum allowable height difference between outdoor unit and indoor unit.	65.6ft (20m)	98.4ft (30m)
Maximum allowable distance between the 3-way valve and the indoor unit (only for installations with domestic hot water tank).	10ft (3m)	10ft (3m)
Maximum allowable distance between the domestic hot water tank and the indoor unit (only for installations with domestic hot water tanks). The thermistor cable supplied with the domestic hot water tank is 39.4 ft. (12 m) in length.	32.8ft (10m)	32.8ft (10m)

(a) When <16.4ft (<5m), recharging of the outdoor unit is required. Refer to the installation manual of the outdoor unit.

WHAT CONSIDERATIONS DO I NEED TO TAKE WHEN SIZING THE HYDRONIC PIPING?

Select piping diameter in relation to required water flow and available ESP of the pump. See following example:



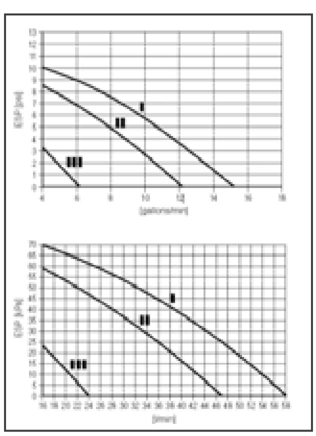
(018-030)

Water flow rate for Hydrobox:

Min (030): 3.2 gpm

Max (030): N/A

(feet of head = psi x 2.31)



(036-054)

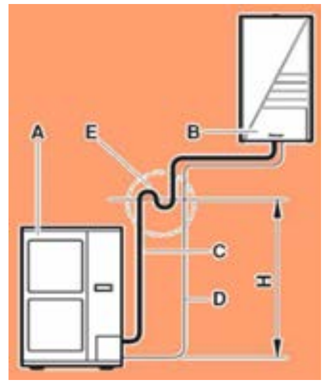
Min (054): 4.2 gpm

Max (054): 15.3 gpm

ARE THERE ADDITIONAL INSTALLATION REQUIREMENTS?

It is sometimes necessary to install an oil trap per the following information: INSTALLATION REQUIREMENTS

Since there is a possibility of oil held inside the riser piping flowing back into the compressor when stopped and causing liquid compression phenomenon. Installed trap required at each.



Difference in height of 32.8 ft. (10 m).

***Trap installation spacing:**

A - Outdoor unit

B - Indoor unit

C - Gas piping

D - Liquid piping

E - Oil trap

The Oil trap is not necessary when the outdoor unit is installed in a higher position than the indoor unit.

CAUTION:

TRAP REQUIRED FOR ERLQ036, 048, 054 MODELS ONLY

All refrigerant piping must be insulated along its full run using a minimum of 1/2” wall thickness insulation (e.g. Armaflex®). It is recommended to use a minimum 3/4” wall thickness insulation when running refrigerant piping through unconditioned spaces, such as attics, garages, crawl spaces, and outdoors. (Refer to local codes.)

Note that:
1. Refrigerant gas and liquid piping should not be insulated together.
2. All joint areas must also be fully insulated.

WHAT IS A DIFFERENTIAL BYPASS VALVE ?

It is a valve that opens and closes automatically in response to motorized zone valves opening and closing. This dissipates the head pressure produced by a heating circulating pump.

WHY SHOULD I USE A DIFFERENTIAL BYPASS VALVE?

If a heating system is fitted with motorized zone valves (MZVs) on, for instance in 5 out of 7 under-floor heating designs, a situation could arise where the (MZVs) close and all the water being circulated by the pump would be forced around the remaining two zones. This could result in increased water velocity and a resultant increase in system noise. The pump is then under more strain and has a shorter life.

IS ANTIFREEZE NECESSARY FOR MONOBLOC DAIKIN ALTHERMA?

Antifreeze can be used in Daikin Altherma Monobloc applications where the site is not occupied or monitored, can be exposed to temperatures below freezing (32°F, 0°C) for long periods of time or could experience a high occurrence of power outages. Only propylene glycol formulated for hydronic heating can be used (must include biocide). Always remember that adding antifreeze will reduce the output capacity of Daikin Altherma and may require larger expansion tank and circulators. To keep antifreeze mixtures at a minimum, Daikin recommends antifreeze and corrosion inhibitor mixtures for burst protection. Refer to installation instructions for propylene glycol mixtures and capacities corrections. Refer to local codes when using antifreeze.

CAN I USE ANTIFREEZE IN SPLIT-TYPE DAIKIN ALTHERMA?

It is allowed but not necessary due to the utilization of water pipes inside the conditioned space. The split-type Daikin Altherma should be installed in the conditioned space.

WHEN IS THE CONDENSATE KIT REQUIRED AND WHAT IS ITS FUNCTION?

The condensate kit (EKHBDP) for the Hydrobox is required for cooling applications. The function of the condensate kit is to insulate the water piping in the Hydrobox to eliminate any water from dripping on and possibly damaging components in the Hydrobox. It is in kit form to facilitate ease of Hydrobox installation. The condensate kit is installed after all required water and refrigerant piping connections have been made to the Hydrobox.

WHAT TYPES OF CONNECTIONS DO I NEED TO INSTALL THE ALTHERMA SYSTEM?

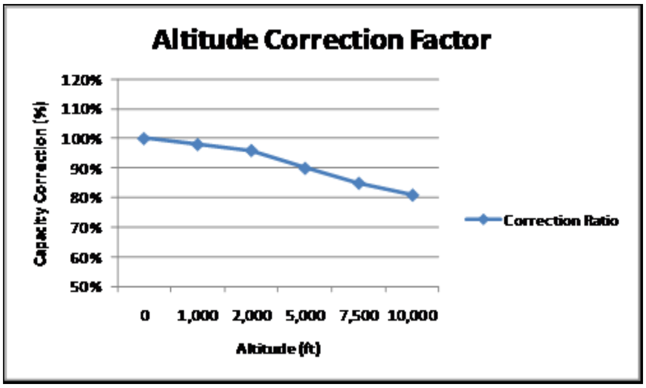
All Daikin Altherma systems are equipped with BSP (British Standard Pipe Thread) connections at the various hydronic components. The BSP connector is similar to, but not interchangeable with, the more common NPT connector. The thread pitch is different in most cases, and the thread angle is 55°instead of the 60°angle found on NPT threads. Daikin Adaptor Kits (BSP to NPT) have been prepared to address challenges in the field with sourcing the necessary fittings to make your installation as easy as possible.

ARE THERE CONSIDERATIONS WHEN INSTALLING THE ALTHERM SYSTEM AT HIGH ALTITUDE LOCATION?

1. Determine the altitude at the considered location for the Daikin Altherma system.
2. Verify the altitude correction factor from the table (see following Altitude table).
3. If an altitude falls within specified values, use the correction graph to determine the applicable capacity correction factor.
4. Since the Daikin Altherma selection and simulator software does not correct for altitude, add the altitude correction factor to the load requirements before the initial selection is made.
5. Conduct the equipment selection based on these conditions as per normal procedures.

Capacity Correction Factor –due to lower air density

Altitude		Density		Capacity
(ft)	(m)	(lb/ft3)	(kg/m3)	%
0	0	0.0807	1.293	100
1,000	305	0.7785	1.247	98
2,000	610	0.0750	1.202	96
5,000	1,524	0.0672	1.076	90
7,500	2,286	0.0611	0.979	85
10,000	3,048	0.0555	0.889	81



WHEN IS THE EKRP1HBAAU DIGITAL I/O PCB KIT REQUIRED?

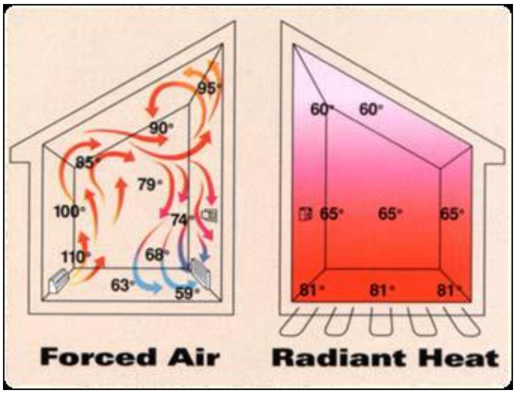
Primarily, this kit is required for solar thermal applications to set solar priority (included with solar kit) and for Bivalent applications. It can also be used with the Hydrobox and outdoor unit for remote alarm and operation status reporting via voltage free (dry) contacts.

WHAT ARE SOME OF BENEFITS THAT DAIKIN ALTHERMA OFFERS?

- Complete renewable solution for home heating and hot water.
- Deliver considerable savings in energy.
- Significant contribution in the fight against CO2 emissions
- Cost effective on installations
- Low energy consumption
- Safe, easy to maintain, and comfortable all year round
- No extensive ground works
- No Flues, fuel lines, or fuel tanks
- Providing all your heating and hot water needs throughout the year
- Superior technology ensuring performance is unaffected in a cool climate, even as low as-4°F (-20°C)

WHAT ARE THE MAIN DIFFERENCES BETWEEN FORCED AIR vs. RADIANT HEAT?

Rooms with **Radiant In-Floor** space heating will have a very uniform temperature from the ceiling to the floor. Heating a basement floor is an ideal application for a radiant heat system. If you've lived in a house with forced air, you know that you can turn up the heat, but the basement floors will remain chilled. Installing a radiant floor warming system will add comfort and warmth to your lifestyle.



WHAT IS THE FACTORY WARRANTY FOR ALTHERMA?

The North American Warranty is:

- **7 years** for the compressor
- **5 years** for parts (including Fan Coil Unit, DHW tank and Hydrobox components).

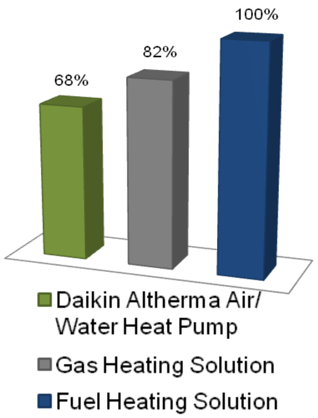
Please refer to the official Daikin AC Warranty Terms and Conditions for detailed information.

Extended Warranties are available

WHAT TYPE OF SAVING ON MY OPERATIN COST WITH DAIKIN ALTHERMA vs. TRADITIONAL HEATING SYSTEM?

Altherma system works more efficiently and saves more energy than a traditional heating system that using fossil fuel. Daikin Altherma generates at least 3 to 5 kW of additional heat per 1kW of electricity used and 66 to 80% additional heat.

OPERATING COSTS:
Conditions: Required annual heating energy: 20,000 kWh.
Source: Energy prices based on EUROSTAT statistics [first semester 2007].



WHERE CAN I GET MORE INFORMATION ABOUT DAIKIN ALTHERMA?

Simply contract us by phone, email or our Daikin AC Web: www.daikinac.com

Product & Applications Support:
1-866-432-4546, Option 2
altherma@daikinac.com
techsupport@daikinac.com

Error code trouble shooting Web site:
www.drdaikin.com SMS: Send the word "Error" and the code to the following number: 32075 (as you would send to any regular phone numbers) For example "Error A3". Please note there must be a space between the words "Error" and "A3". Press send. Within 30 seconds you will receive a reply back.

Parts Identification Support: Phone
1-866-432-4546, Option 3
spareparts@daikinac.com

Training -Schedule & Registration Support
1-866-432-4546, Option 4
training@daikinac.com

DAIKIN AC
absolute comfort

WARNINGS
Always use a licensed installer or contractor to install this product. Improper installation can result in water or refrigerant leakage, electrical shock, fire or explosion.
Use only those parts and accessories supplied or specified by Daikin. Ask a licensed contractor to install those parts and accessories. Use of unauthorized parts and accessories or improper installation of parts and accessories can result in water or refrigerant leakage, electrical shock, fire or explosion.
Read the User's Manual carefully before using this product. The User's Manual provides important safety instructions and warnings. Be sure to follow these instructions and warnings. For any inquiries, contact your local Daikin sales office.

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