

Air-Handler:

The Rinnai Hydronic Air-Handlers are designed to be matched with our Tankless Water Heaters to provide combination space heating and domestic hot water for residential applications. This unit is also capable of providing the necessary cooling/heatpump heating when paired with an add-on evaporator and condensing/heatpump unit.

Discharge opening sizes are as per Table 1 in the Installation, Operation and Maintenance Manual (refer to dimensions 'B' and 'C'). For high static application, unit shall be configured for up-flow with either bottom return (no modification required) or side return (modification required, refer to installation section of manual).

Unit Restriction: Add on cased evaporator coil to be installed on units' discharge side only.

Conventional Ducting (Low Velocity):

Use good engineering practice when designing air distribution (ducting) systems; Rinnai recommends the use of any of the following codes and standards or combination thereof:

- HRAI's Residential Air System Design Manual.
- Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) 2001 Fundamentals Handbook Chapter 34 or 2000 HVAC Systems and Equipment Handbook Chapters 9 and 16
- US and CANADA: Air Conditioning Contractors Association (ACCA) Manual D

High Static Ducting (General Requirements):

The outlined high static guidelines are based on insulated galvanized round ducts with specifications as follows:

- Air supply plenums to be of sizes as specified for unit's discharge opening (refer to Rinnai's Installation, Operation and Maintenance Manual).
- Minimum plenum height to be 42-inches from top of unit. It is recommended that the plenum be acoustically lined to promote sound attenuation.
- Number of 8" dia. main take-offs to be as specified in Table 1.
- Maximum equivalent lead length for each 3" dia duct to be 25 feet.
- Directional, 3" vertical throw grill should be used.
- All ducting to be insulated.
- Return air ducting to be in accordance with conventional low velocity duct design.
- For return opening sizes, refer to Rinnai's Installation, Operation and Maintenance Manual for specific dimensions.
- For optimum system operation, it is recommended that **total system external static pressure should not exceed 0.5" w.c.** (Refer to the Installation, Operation, and Maintenance manual for fan curves.)
- High static duct systems operate at a higher pressure than traditional duct systems; care must be taken to seal all joints and seams with duct compound or tape to ensure proper air distribution and noise reduction.
- If final connection between branch duct and diffusers are made with other than rigid, round ducting (ie. flexible ducting); care **MUST** be taken to avoid multiple bends as this will increase system external static pressure and reduce air flow.
- Use round galvanized ducts for all main and branch ducting; flexible ducting may be used for final connection to diffusers, limit flexible duct runs to three-feet maximum.
- For maximum duct velocities refer to Table 2.
- For each 90 degrees elbow assume 10 equivalent feet of straight duct.

High Static Air Distribution System Guidelines

Table 1: High Static Duct Design

UNIT MODEL NUMBER	COOLING CFM @ 0.5 ESP	Number of 8" diameter main take-offs	Minimum # of 3"Ø branch ducts (70 cfm ea.)	Optimum # of 3"Ø branch ducts (60 cfm ea.)	Maximum # of 3"Ø branch ducts (50 cfm ea.)	Total Nominal Heating Capacity (MBH) for inlet water at				
						120 F (48.9 C)	130 F (54.4 C)	140 F (60 C)	150 F (65.6 C)	160 F (71.1 C)
37AHA04508KA5	800	2	12	13	16	32.0	38.5	44.5	50.5	57.0
37AHA06012KA5	1200	3	17	20	24	38.5	46.0	53.0	61.0	68.0
37AHA07514KA5	1600	3	23	27	32	50.0	58.5	68.0	77.0	86.5
37AHA09016KA5	1750	4	25	29	35	55.0	64.5	75.0	86.5	97.5

Notes:

- For total nominal cooling capacities refer to add-on evaporator and/or condensing unit manufacturer's specifications.
- For air flow table, unit specs, match set (Air Handler / Tankless Water Heater) and heating capacities refer to Rinnai Hydronic Air Handler's Manual.
- 1,000 BTU/h = 1 MBH
- ESP = External Static Pressure
- CFM = Cubic Feet per Minute
- ϕ = Diameter

Table 2: Recommended Maximum Duct Velocities for High Static Systems (FPM)

APPLICATION	Controlling Factor - Duct Friction			
	Main Ducts		Branch Ducts	
	Supply	Return	Supply	Return
Townhomes, Apartments, Hotel Bedrooms, Hospital Bedrooms	1500	1300	1200	1000

Note:

- FPM = Feet Per Minute

Maximum Branch Duct Length of 25 Equivalent Feet:

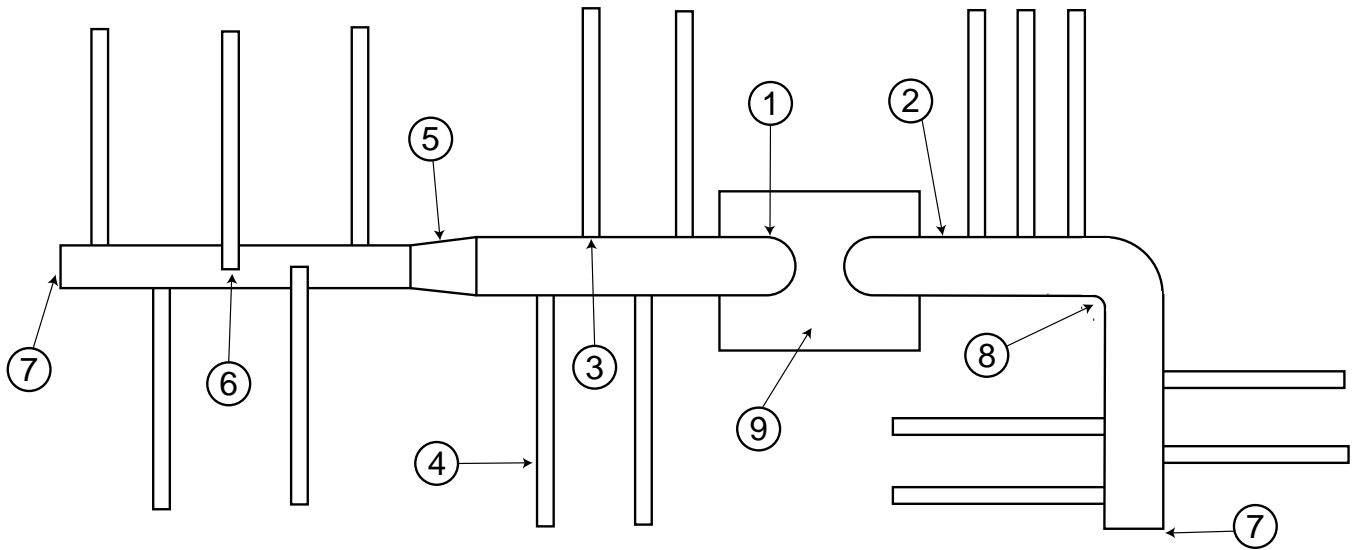
- Where the maximum air distribution branch ducts are 25 feet or less, some branch ducts may be taken off the plenum using side or top takeoffs; good engineering practice should be followed.
- Refer to Table 1 above to determine the optimum number of branch ducts allowable.
- A room by room heat loss and heat gain calculation is recommended.
- Balance the airflow, heat or cooling output (whichever is greater) at each grill using a CFM range of 50-70 per branch duct, measured outputs to be within 25% of design.

Branch Duct Longer Than 25 Equivalent Feet:

For systems where the length from grill to plenum is longer than 25 equivalent feet, main 8 inch diameter ducts are required (Refer to Table 1). General design criteria for this system are:

- 8-inch trunks should be designed for 500 cfm maximum of heating or cooling (whichever is greater)
- Refer to Table 1 for the required number of 8-inch diameter main duct required for specific unit model.
- A maximum of 10 three-inch branch ducts may be taken-off any 8-inch main.
- A minimum of 7 three-inch branch duct take-offs are required for each 8-inch main.
- The main trunk shall be reduced to 6-inch diameter after 4 take-offs.
- Take-offs shall be spaced a minimum of 20" apart.
- Take-offs can be oriented in any suitable direction.

DUCT DESIGN EXAMPLE USING 37AHA040508KA5



- (1) 8" TAKE OFF, SIDE OR TOP
- (2) 8" GALV, SPIRAL, ETC
- (3) 3" SADDLE
- (4) 3" FLEX DUCT
- (5) 8" TO 6" REDUCER
- (6) 3" TAKE OFF FROM SIDE, TOP OR BOTTOM
- (7) END CAPS
- (8) ELBOW, EQUIVALENT LENGTH 10 FT
- (9) 37AHA04508KA5 AIR HANDLER