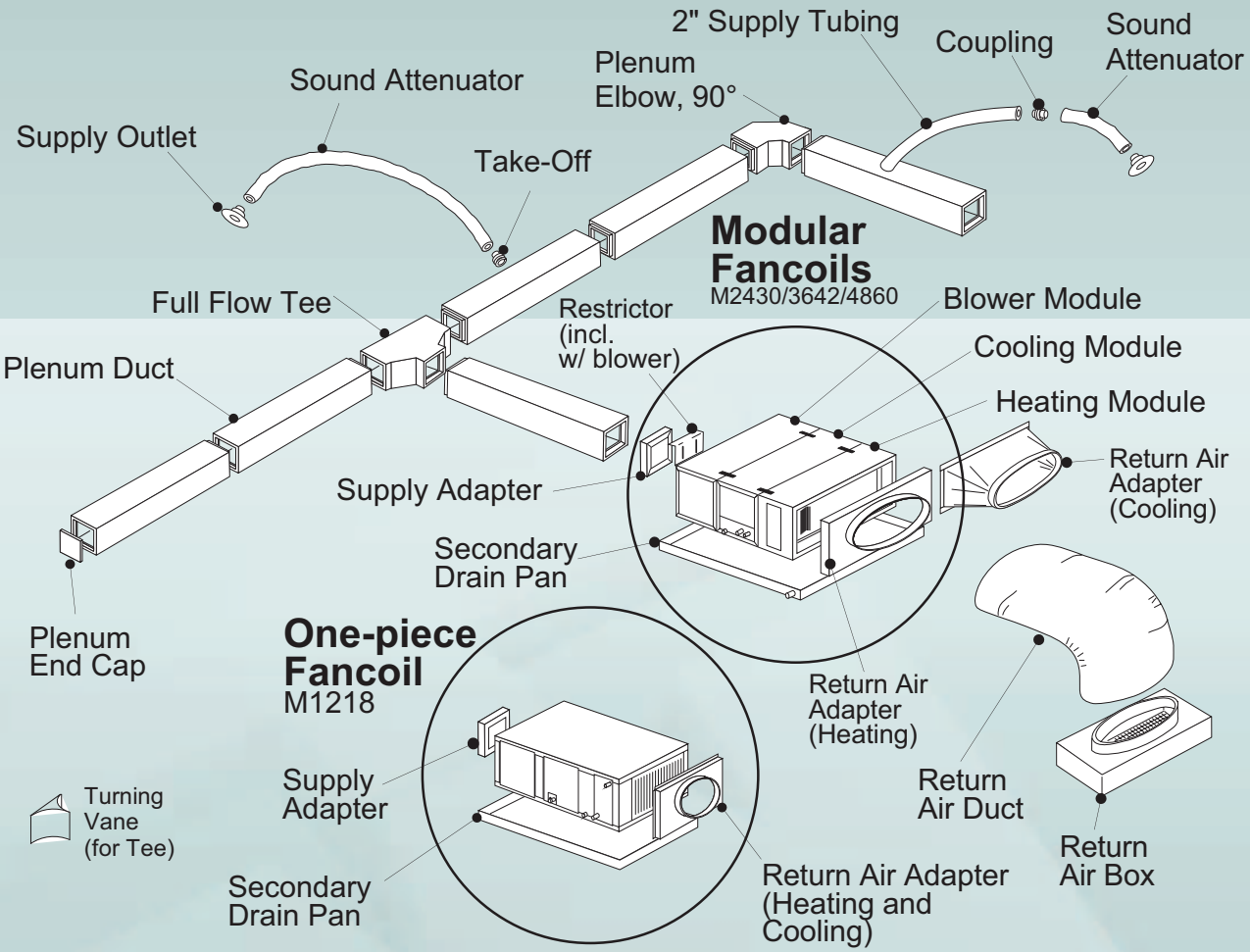
The Unico System®

MINI DUCT SYSTEM



Marketed By

WOLF INTERNATIONAL

WOLF International (WI) in association with various factories around the world brings quality products for its customers in Middle East, South Asia and Africa region. We appreciate you interest in 'WI' product range and look forward to serve you with wide product portfolio.

WOLF International (WI) now proudly introduces its latest product - the mini duct system

The Unico System®

Registered to ISO 9001 and ISO 13485 File Number: A12660

The desired architecture for your new Home, Office or any Commercial or Retail outlet is your right. The Uniqueness of the design is reflection of your identity. It can not be constraint by requirements from other services such as Air conditioning ducts. To fullfill this market demand WOLF International launches a unique mini duct AC system 'THE UNICO SYSTEM' (Made in USA) in the region. It gives a superior cooling and / or heating experience while fitting in your style of interior design. The flexible small ducts weave through the smallest places, ceilings, walls and even floors, saving lot of space in new construction and avoid costly messy renovations. It is a silent, hidden, practically unnoticeable comfort provider all year round.

Retrofitting Restored Homes

Historic Renovation, St. Louis, MO

Prefect Choice for Restored Premises. Its small, flexible, 1/3 rd size of Conventional A/C duct system. Fits in existing construction. No compromise on design, No heavy Bulk heads / dropped ceilings. Ducts are so small they hide in walls, ceilings or even floors. Outlets are so small and conveniently submerge in interior.

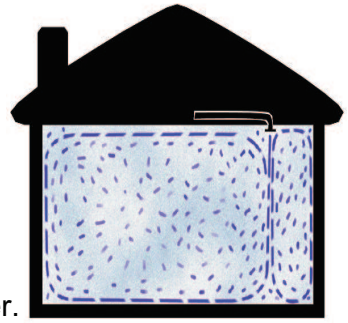
New Construction and Custom Homes

New Construction, Laguna Beach, CA

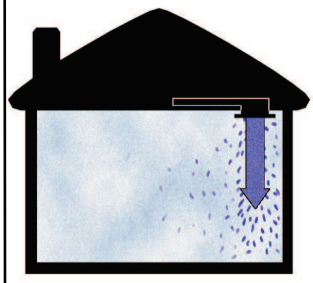
Perfect Choice for custom built premises. Curved walls or Mosque Domes or whatever your imagination is the guide for design and not the size of AC duct work. The Unico System duct work is virtually Invisible. Structure can be accommodating the duct work with out any major design change. Outlets are available in any color, finishes to match the aesthetics.

DRAFT FREE EVEN TEMPERATURES ALL AROUND ROOM

The Unico System
gently circulates air throughout each room, eliminating drafts, and thermal shocks, providing even temperatures from ceiling to floor and in each room corner.



ASPIRATION AIR FLOW

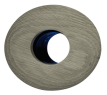


The conventional AC system is designed to dump air into the room, causing uncomfortable drafts, & hot and cold spots.

MATCHES ANY DÉCOR

The Unico System
Outlets are small, subtle and blend into any décor. For the look that best suits your needs, a variety of styles and finishes are available.
Choose from while or black plastic, chrome, brass and several wood species or simply paint or stain the outlet to perfectly match room color scheme.

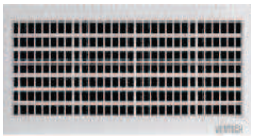
ORIGINAL
5" Outer Diameter Plastic Outlet for Ceiling Applications (Available in white, black, brass or chrome finishes)



WOODEN
5" Outer Diameter Wood Outlet for Hardwood Floor Applications (Available in a variety of wood species)

SLOPED
15° and 25° Angled Outlets for Sloped Ceilings and Walls

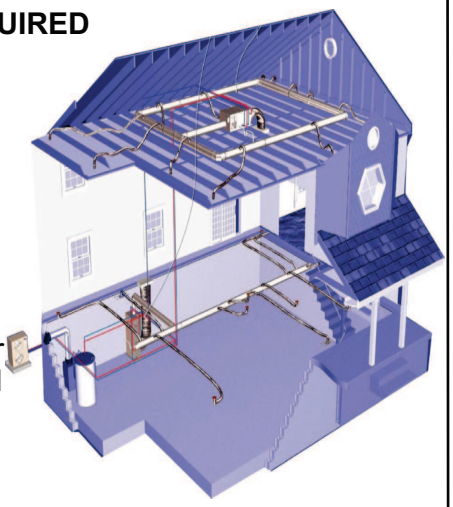
SLOTTED
1/2" x 8" Slotted Outlet for Sidewall Applications (Available in a variety of finishes and wood species)



The conventional AC system provides similar looking grilles / diffusers taking prominent position in your room décor with identical finish in any premises. Any attempt to change the look proves expensive to buy and to maintain later on.

LITTLE CHANGES REQUIRED

The Unico System
fits into places where conventional systems can not, modular indoors fits into any ceilings or closets and the flexible ducts are routed through ceilingm, floors or wall cavities eliminating major unsighlty and noisy metal ductwork.

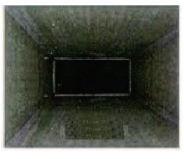


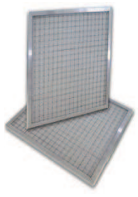
The conventional AC system changes provoke major changes in False Ceiling layouts, not much options are available to for unit reloaction or Duct lay out changes or grille diffuser reloaction.

HYGINE PROVIDER

The Unico System
1. 30% more effective in removing Humidity. Provides Healthy Air Quality helping patients with breathing troubles such as Asthama.

CLEAN UNICO DUCT





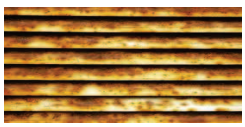
2. Ducts size are 1/3 rd in size. Air is pumped in at high pressure using full cross section Area of duct avoiding fungus formation in unused corners.

3. Many levels of AIr Filteration options such as pleated, Electron Electroststic are available.

The conventional AC system is designed with High Relative Humidity Air off conditions. It works to meets sensible loads ignores latent load.

CONVENTIOANL DUCT FROM INSIDE

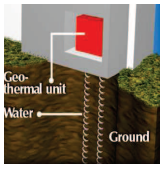
The conventional AC system have large ducts with air at low pressure The ducts are often dirty with the fungus formation in unused corners, which after drying mixes in air making people sick.



CONVENTIOANL GRILLE

The conventional AC suppliers provide simple washable filters with low efficiency.

"THE UNICO SYSTEM" is available in 4 basic models. The models are designed for universal application. They can be mounted horizontally as well as vertically (UP or down flow) depending on the space availability. They can be modified for our door installation as well. The unit is equipped with radial fan mounted on Standard single speed, 2 speed or Variable speed EC motor. Coils section is equipped with specially design coils for application

MODEL	INSTALLTION	Type	Tons	MAX		Various Applications
				cfm	St. Pr. Inch	
1218		SINGLE PIECE	1 1.5	450	2.0	DX COOLING / HEAT PUMP  DIGITAL SCROLL V.R.  CHILLERS  DISTRICT COOLING  GEO THERMAL  SOLAR 
2430		MODULAR	2.0 2.5	870	2.0	
3642			3.0 3.5	1240	2.0	
4860			4.0 5.0	1472	2.0	

Bulletin 40-40 / October 2003

INTRODUCTION

This bulletin describes the design steps necessary for a successful Unico System installation. There are only four basic steps. They follow a logical path of reviewing the requirements of the application then choosing the proper equipment with the final result being a detailed duct layout specific to the building.

As described above, the steps are as follows:

Step 1. Perform Load Analysis
Step 2. Select Equipment and System Airflow
Step 3. Calculate Required Airflow per Room
Step 4. Create Duct System

STEP 1: Perform Load Analysis.

DETAILED METHOD: The following method is required for all systems.

Design requirements.

- Use ASHRAE/ACCA tables for outdoor design conditions
- summer indoor design temperature should be 2°F (1°C) greater than conventional system indoor design temperature
- summer indoor design relative humidity should be 45% rather than 50% as in a conventional system
- Choose appropriate outside design temperature for your specific geographic location.
- Indoor temperature limits:
  refrigerant cooling systems = 70°F (21°C) min.;
  heat pump heating = 90°F (32°C) max.;
  water-based systems = within 10 degrees of water temperature
- Outdoor temperature limits (refrigerant systems):
  cooling = between 75 and 115°F (23 and 46°C);
  heating = between 15 and 65°F (-9 and 18°C)
- Specify to the building owner what design temperatures were used

The most common design indoor temperature (dry bulb)
75°F (23.8°C) for cooling, and
70°F (21.1°C) for heating.

Load Calculations

- Use ACCA Manual J, or ASHRAE method (Wrightsoft Right-Suite for Unico computer program)
- Calculate room-by-room loads for both heating and cooling
- Latent factor (LF) = 1.3 for leaky homes
  LF=1.2 for tight homes
- when installing in an unconditioned space, for cooling systems use 8% duct loss compared to a 18% for a conventional system; for heating systems use 12% duct loss compared to 25% for conventional systems.
- If open staircase between rooms, push 20% of downstairs open room load to the upstairs because of chimney effect, vice versa when heating

Unico has partnered with Wrightsoft to provide design tool, a specific Small-Duct High-Velocity (SDHV) module with their computer software program. The Right-HV or Right-Suite program is available for purchase directly from Wrightsoft at www.wrightsoft.com.

STEP 2: SELECT EQUIPMENT AND AIRFLOW.

Equipment Selection and Size

- Use ARI ratings to select equipment
- Select basic unit size based on cooling load, do not oversize by more than 1 ton (3.5 kW)
- Choose hot water and electric heater sizes

Under ARI rated conditions of 80°F dry bulb and 67°F wet bulb (26.7°C/19.4°C) the Unico System has a sensible heat ratio (SHR) between 0.58 and 0.65, depending on the condensing unit. Compare this to conventional systems that have a SHR between 0.75 and 0.85.

Because most residential homes have a SHR between 0.70 and 0.80, the conventional systems almost never remove enough moisture whereas the Unico System is more than able to reduce the humidity.

Table 2. Minimum Airflow for Refrigerant Coils

Nominal Capacity, Tons (kW)	Unit Size	Airflow, CFM (m3/s)			
		Minimum		ARI Rated	
		Normal	Dry Climate	AC	HP
1 (3.5)	1218	250 (0.12)	300 (0.14)	400 (0.19)	
1 ½ (5.3)		300 (0.17)	350 (0.17)		
2 (7.0)	2430	400 (0.19)	500 (0.24)	600 (0.28)	600 (0.28)
2 ½ (8.8)		500 (0.24)	625 (0.29)		685 (0.32)
3 (11)	3642	600 (0.28)	750 (0.35)	850 (0.40)	
3 ½(12)		700 (0.33)	875 (0.41)	1000 (0.47)	
4 (14)	4860	800 (0.38)	1000 (0.47)	1250 (0.59)	
5 (18)		1000 (0.47)	1250 (0.59)		
Approx. CFM/ton		200	250		

Table 1. Unico System Cooling Capacity and Condenser Match

Unico System Model	Nominal Condenser Size, tons (kW)	Approx. Rated* Capacity, Btu/hr (kW)	Comparative Capacity**, Btu/hr (kW)	Minimum Airflow, CFM (L/s)	Rated Airflow, CFM (L/s)	Number of Outlets		Maximum Blower Static, in. wc (Pa)
						Min.***	Max.	
1218	1 (3.5)	10,000 (2.9)	10,800 (3.2)	250 (118)	300 (141)	8	15	1.9 (470)
	1.5 (5.3)	15,000 (4.4)	16,000 (4.7)	300 (141)	350 (165)	11	20	1.7 (420)
2430	2 (7.0)	22,000 (6.4)	23,000 (6.7)	400 (188)	500 (235)	13	25	2.0 (500)
	2.5 (8.8)	25,000 (7.3)	27,000 (7.9)	500 (235)	625 (300)	15	30	1.8 (445)
	3 (10.5)	27,000 (7.9)	29,000 (8.5)	600 (282)	700 (330)	18	35	1.6 (400)
3642	3 (10.5)	29,000 (8.5)	32,000 (9.4)	600 (282)	750 (353)	18	35	1.6 (400)
	3.5 (12.3)	37,000 (10.8)	40,000 (11.7)	700 (330)	875 (412)	21	40	2.1 (523)
	4 (14.1)	40,000 (11.7)	43,000 (12.5)	800 (377)	1000 (472)	25	50	1.8 (450)
4860	4 (14.1)	44,000 (12.9)	47,000 (13.8)	800 (377)	1000 (472)	25	50	1.6 (400)
	5 (17.6)	51,000 (14.9)	54,000 (15.8)	1000 (472)	1250 (472)	32	60	1.5 (370)

* Using ARI rated airflow in Table 2. Refer to the ARI Unitary Directory for ratings with specific condensing units.
** Needed capacity of a conventional system to provide the same comfort of the Unico System will vary depending on humidity load.
*** Based on 33 to 40 CFM (15 to 19 L/s) per outlet. Verify minimum total system airflow. Use additional outlets as necessary.

STEP 3: CALCULATE AIRFLOW PER ROOM

In the case where the required number of outlets in a room is different for heating and cooling, a decision must be made whether to adjust the number of outlets by plugging, or to compromise either the heating or cooling in that room. An effort should be made to avoid adjusting the number of outlets by plugging and to take advantage of the air mixing between rooms.

STEP 4: DUCT LAYOUT AND NUMBER OF OUTLETS

This procedure assumes the takeoffs are relatively evenly spaced along the length of the plenum. Small clusters of takeoffs are acceptable. When there is a long length of plenum between clusters or a long distance before the first takeoff, the plenum may have to be oversized or the number of takeoffs may have to be increased.

When the number of heating and cooling outlets for a adjacent rooms differs by less than 10 percent, it makes sense to install the proper number of outlets for the most important season. For example, heating may be more critical in Michigan, so use the correct number of outlets for heating in each room and let the cooling reach its own equilibrium.

System Sizing Worksheet

1. Building Load

1a) **T1** = _____ Btuh Heat Gain (cooling load)

1b) **T2** = _____ Btuh Heat Loss (heating load)

2. Equipment Capacity

2a) **TH1** = _____ Btuh Cooling Capacity

2b) **TH2** = _____ Btuh Electric Heat Capacity

2c) **TH3** = _____ Btuh Hot water Capacity

3. Minimum Air Flow, use the largest number

3a) **Q1** = _____ CFM (from Table 2)

3b) **Q2** = _____ CFM (INST 4894 electric heater instructions)

3c) **Q3** = _____ CFM (Eng Spec 3994 for hot water coils)

3d) **Q** = _____ CFM (the maximum of **Q1**, **Q2**, or **Q3**)

4. (Optional) No. of full outlets, **NF** = _____ / **40** = _____

5. (Optional) Capacity of "full" outlet

5a) **C1** = _____ Btuh / _____ = _____ Btuh/outlet (cooling)

5b) **C2** = _____ Btuh / _____ = _____ Btuh/outlet (heating)

6. Required Air Flow per Room

6a) **QR1** = **Q** × **TR1/T1** = _____ / _____

6b) **QR2** = **Q** × **TR2/T2** = _____ / _____

7. (Optional) Number of "Full" outlets per room

7a) **NF1** = **QR1** / **40**

7b) **NF2** = **QR2** / **40**

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8. Check Available Static Pressure

8a) Equivalent Length of Plenum before first outlet

_____ No. Elbows × 15 = _____ ft.
_____ No. Tees × 5 = _____ ft.
_____ No. Side Branches × 10 = _____ ft.
_____ Straight Length = _____ ft.
EL = _____ ft.

8b) **SP1** = **EL** × **factor** / 100
= _____ ft × _____ / 100
= _____ inch wc.

8c) **SPA** = **SPmax** (from Table 1) - **SP1** = _____ - _____ = _____ inches water

If SPA is less than 1.5 in.wc. (372 Pa), you will not achieve 40 cfm (18.9 L/s) from a typical 10 foot (3 m) branch run. Either continue to step 9 and use more outlets than the minimum, or reduce the number of plenum fittings or use a larger plenum size and repeat step 8, or a combination of both.

9. Determine Airflow from each outlet based on Length, **AR**, (from Figure 2).

10. Determine number of outlets per room

10a) **NR1** = **QR1** / **AR**

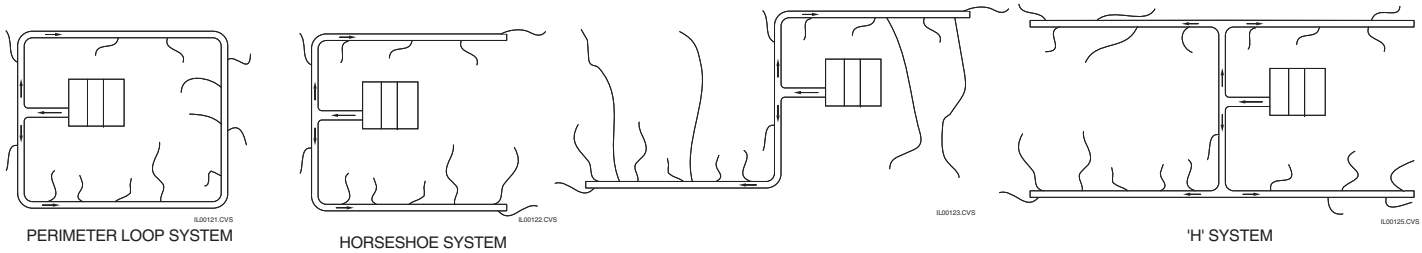
10b) **NR2** = **QR2** / **AR**

Outlets

- **6 Per Ton (3.5 kW).** For refrigerant cooling applications the airflow must be between 200 and 250 CFM per nominal ton [27 to 33 L/s per nominal cooling kW]. For hot water or chilled water systems, refer to performance charts for determine the required airflow. The allowable airflow range per outlet is 20 to 40 CFM [9.4 and 19 L/s], where the typical outlet will deliver 35 CFM [17 L/s] if the plenum static pressure is 1.5 inches [0.37 kPa] and the branch duct length is 10-foot (3 meter) without any balancing orifices. Therefore, the average project will require about 6 outlets per nominal ton [6 outlets per 3.5 kW] although more will be needed if the branch ducts are longer, balancing orifices are used, the plenum static pressure is less than 1.5 inches of water [0.37 kPa], or it is desirable to make the system as quiet as possible. *For example, two runs with 50% balancing orifices are equal to one branch run without any orifices.*
- **10% Rule.** For supply ducts longer than 10 feet (3 meter), the air is reduced in that run by 10% for every 5 feet over 10 (every 1.5 meter over 3 meters). *For example, a 30 foot [9 meter] run is 60% of an outlet that is 10 foot [3 m] yielding a reduction of 40% (30-10=20, 20÷5=4, 4×10=40%).*
- **Consider Traffic Pattern.** Place outlets out of traffic pattern. A corner, 5-inch [127 mm] from each wall, is a good location, or along walls, or in soffits blowing horizontally. Consider floor outlets (with screens) for units located in basement. Slotted outlets can be used for high wall locations or in ceilings where there is insufficient room for bending tubing.
- **Allow for Aspiration.** Locate outlets so the air stream does not impinge on any objects or people — at least 3 feet [1 m] away. Use outlet deflectors and outlet balancing orifices sparingly as they disrupt the aspiration.
- **Minimize Length, Minimize Restriction.** Keep the supply duct length as close to 10 feet [3 m] as possible and never less than 6 feet [1.8 meters]. Use the fewest number of bends as possible. Maximize the radius of any bends making sure the bend in the sound attenuator tubing near the outlet is at least 6-inch [152 mm].

Plenum

- **Maximize Length, Minimize Restriction**. Run main trunk (plenum) as long as possible; it is better to lengthen the plenum if you can shorten even two outlet runs. Use full flow tees with turning vanes (when applicable) and full flow elbows. The maximum total plenum length is 150 ft [45 m]; consider the first tee equal to 30 ft [9 m] and elbows equal to 15 ft [4.6 m].
- **60/40 Rule.** When using a tee split the flow as close to 50/50 as possible — no more than 60/40. Always use a turning vane.
- **70/30 Rule.** Turn the tee 90° to make a side branch with no more than 30 percent of the air. Do not use a turning vane
- **Horseshoe Patterns.** (Best Method). Use a tee at least 24 inches [610 mm] off unit. For the 4860 unit, use 10-inch [254 mm] metal up to and including tee; then use 9-inch [229 mm] both directions. For the 3642 unit, use 9-inch [229 mm] insulated metal up to and including tee; then use 7-inch [178 mm] both directions. If possible, close the horseshoe into a perimeter loop.



PERIMETER LOOP SYSTEM HORSESHOE SYSTEM 'H' SYSTEM

Plenum (cont.)

- **Shotgun Pattern.** For the 4860 unit, use 10-inch [254 mm] insulated metal or fiberglass duct for the first 30 percent; then reduce to 9-inch [229 mm] if desired. For the 3642 unit, use 9-inch [229 mm] insulated metal or fiberglass duct for the first 40 percent; then reduce to 7-inch [178 mm] if desired. For the 2430 unit, 7-inch [178 mm] may be run the entire length.

- **24-inch (610 mm) Rule.** Use at least 24-inch [610 mm] of straight plenum before any fitting, such as an elbow, tee, or takeoff. Electric duct heaters require 48 inches [1.2 m]. Avoid elbows directly off units.
- **Space Takeoffs Evenly.** Maintain distance between takeoffs as evenly as possible. Space the takeoffs at least 6-inch [152 mm] apart and 12-inch [305 mm] from end cap.

CHILLED WATER PERFORMANCE

FOR PHYSICAL, ELECTRICAL DATA & RATING REFER Bulletin 20-18 & Bulletin 0.20.7

M1218W

Entering Water Temperature		Water Flowrate		Airflow, SCFM (m^3/s)									WPD	
				200 (0.09)			300 (0.14)			400 (0.19)				
				Capacity			Capacity			Capacity				
°F	°C	GPM	(L/s)	MBH	(KW)	SHR	MBH	(KW)	SHR	MBH	(KW)	SHR	ft. water	(KPa)
40	(4.4)	2	(0.13)	11.1	(3.25)	0.62	14.1	(4.13)	0.64	16.0	(4.68)	0.67	1.2	(3.60)
		4	(0.25)	11.9	(3.48)	0.61	15.8	(4.63)	0.62	18.7	(5.47)	0.64	4.6	(13.80)
		6	(0.38)	12.5	(3.66)	0.60	17.2	(5.04)	0.61	20.9	(6.11)	0.62	9.9	(29.70)
45	(7.2)	2	(0.13)	8.6	(2.52)	0.66	10.7	(3.14)	0.71	12.2	(3.58)	0.75	1.1	(3.30)
		4	(0.25)	10.1	(2.96)	0.63	13.3	(3.90)	0.65	15.7	(4.61)	0.68	4.5	(13.50)
		6	(0.38)	10.6	(3.11)	0.62	14.5	(4.25)	0.64	17.5	(5.14)	0.65	9.9	(29.70)
50	(10.0)	2	(0.13)	6.9	(2.02)	0.72	8.7	(2.55)	0.78	10.1	(2.96)	0.82	1.1	(3.30)
		4	(0.25)	8.1	(2.37)	0.68	10.7	(3.14)	0.71	12.7	(3.72)	0.74	4.5	(13.50)
		6	(0.38)	8.5	(2.49)	0.67	11.6	(3.40)	0.69	14.0	(4.09)	0.71	9.8	(29.40)
Minimum Number of Outlets				6			9			12				

MC2430W

Entering Water Temp., °F (°C)	Water Flow Rate, gpm (L/s)		Airflow, CFM (L/s)								Water Pressure Drop, ft. water (kPa)	
			400 CFM (190 L/s)		500 CFM (240 L/s)		600 CFM (280L/s)		700 CFM (330 L/s)			
			Capacity MBtu/hr (kW)	SHR	Capacity MBtu/hr (kW))	SHR	Capacity MBtu/hr (kW)	SHR	Capacity MBtu/hr (kW)	SHR		
40 (4.4)	2	(0.13)	18.9 (5.5)	0.64	21.1 (6.2)	0.66	22.7 (6.7)	0.68	24.0 (7.0)	0.69	1.0	(3.0)
	4	(0.25)	22.2 (6.5)	0.62	25.4 (7.5)	0.63	28.1 (8.2)	0.64	30.3 (8.9)	0.66	3.3	(9.9)
	6	(0.38)	24.2 (7.1)	0.61	28.5 (8.3)	0.61	32.0 (9.4)	0.62	35.1 (10.3)	0.63	7.5	(22.4)
	8	(0.50)	25.2 (7.4)	0.60	30.0 (8.8)	0.61	34.2 (10.0)	0.61	37.9 (11.1)	0.62	12.7	(38.0)
45 (7.2)	2	(0.13)	16.0 (4.7)	0.68	17.9 (5.3)	0.70	19.4 (5.7)	0.72	20.7 (6.1)	0.74	0.9	(2.7)
	4	(0.25)	18.7 (5.5)	0.65	21.5 (6.3)	0.66	23.7 (7.0)	0.68	25.7 (7.5)	0.70	3.4	(10.2)
	6	(0.38)	20.4 (6.0)	0.63	24.0 (7.0)	0.64	26.9 (7.9)	0.65	29.5 (8.6)	0.66	7.4	(22.1)
	8	(0.50)	21.3 (6.2)	0.62	25.3 (7.4)	0.63	28.8 (8.4)	0.64	31.9 (9.4)	0.65	12.6	(37.7)
50 (10)	2	(0.13)	13.1 (3.8)	0.74	14.8 (4.3)	0.77	16.3 (4.8)	0.79	17.4 (5.1)	0.80	0.9	(2.7)
	4	(0.25)	15.1 (4.4)	0.70	17.4 (5.1)	0.72	19.3 (5.7)	0.74	21.0 (6.2)	0.76	3.4	(10.2)
	6	(0.38)	16.4 (4.8)	0.68	19.3 (5.6)	0.69	21.7 (6.4)	0.71	23.8 (7.0)	0.72	7.3	(21.8)
	8	(0.50)	17.1 (5.0)	0.67	20.3 (6.0)	0.68	23.1 (6.8)	0.69	25.6 (7.5)	0.70	12.4	(37.1)
Minimum No. of Outlets			12		15		18		21			

MC3642W

Entering Water Temp., °F (°C)	Water Flow Rate, gpm (L/s)		Airflow, CFM (L/s)								Water Pressure Drop, ft. water, (kPa)	
			700 CFM (330 L/s)		800 CFM (380 L/s)		900 CFM (425 L/s)		1000 CFM (470 L/s)			
			Capacity MBtu/hr (kW)	SHR	Capacity MBtu/hr (kW)	SHR	Capacity MBtu/hr (kW)	SHR	Capacity MBtu/hr (kW)	SHR		
40 (4.4)	4	(0.25)	32.8 (9.6)	0.64	35.2 (10.3)	0.66	37.2 (10.9)	0.67	38.9 (11.4)	0.68	2.1	(6.3)
	6	(0.38)	37.9 (11.1)	0.62	41.1 (12.0)	0.63	43.9 (12.9)	0.64	46.4 (13.6)	0.64	5.2	(15.5)
	8	(0.50)	40.8 (11.9)	0.61	44.7 (13.1)	0.62	48.2 (14.1)	0.62	51.3 (15.0)	0.63	8.9	(26.6)
	10	(0.63)	42.5 (12.4)	0.61	46.9 (13.7)	0.61	50.9 (14.9)	0.61	54.6 (16.0)	0.62	13.5	(40.4)
45 (7.2)	4	(0.25)	27.9 (8.2)	0.68	30.0 (8.8)	0.69	31.8 (9.3)	0.71	33.4 (9.8)	0.72	2.2	(6.6)
	6	(0.38)	31.9 (9.4)	0.65	34.7 (10.2)	0.66	37.1 (10.9)	0.67	39.2 (11.5)	0.68	5.2	(15.5)
	8	(0.50)	34.4 (10.1)	0.64	37.6 (11.0)	0.64	40.6 (11.9)	0.65	43.2 (12.7)	0.66	8.8	(26.3)
	10	(0.63)	35.8 (10.5)	0.63	39.5 (11.6)	0.64	42.9 (12.6)	0.64	46.0 (13.5)	0.65	13.4	(40.1)
50 (10)	4	(0.25)	22.8 (6.7)	0.74	24.7 (7.2)	0.76	26.3 (7.7)	0.77	27.8 (8.2)	0.78	2.2	(6.6)
	6	(0.38)	25.8 (7.6)	0.70	28.1 (8.2)	0.72	30.2 (8.8)	0.73	32.0 (9.4)	0.74	5.1	(15.2)
	8	(0.50)	27.6 (8.1)	0.69	30.3 (8.9)	0.70	32.7 (9.6)	0.71	34.9 (10.2)	0.72	8.7	(26.0)
	10	(0.63))	28.8 (8.4)	0.68	31.8 (9.3)	0.68	34.5 (10.1)	0.69	37.0 (10.8)	0.70	13.2	(39.5)
Minimum No. of Outlets			21		24		27		30			

MC4860W

Entering Water Temp., °F (°C)	Water Flow Rate, gpm (L/s)		Airflow, CFM (L/s)								Water Pressure Drop, ft. water (kPa)	
			900 CFM (425 L/s)		1000 CFM (470 L/s)		1100 CFM (520 L/s)		1250 CFM (590 L/s)			
			Capacity MBtu/hr (kW)	SHR	Capacity MBtu/hr (kW)	SHR	Capacity MBtu/hr (kW)	SHR	Capacity MBtu/hr (kW)	SHR		
40 (4.4)	4	(0.25)	37.9 (11.1)	0.67	39.8 (11.7)	0.68	41.6 (12.2)	0.70	43.9 (12.9)	0.72	1.6	(4.7)
	6	(0.38)	45.1 (13.2)	0.63	47.9 (14.0)	0.64	50.4 (14.8)	0.65	53.7 (15.7)	0.67	4.0	(11.9)
	8	(0.50)	49.7 (14.6)	0.62	53.2 (15.6)	0.62	56.4 (16.5)	0.63	60.6 (17.7)	0.64	7.1	(21.2)
	10	(0.63)	52.7 (15.4)	0.61	56.7 (16.6)	0.62	60.5 (17.7)	0.62	65.5 (19.2)	0.63	10.7	(31.9)
	12	(0.76)	54.6 (16.0)	0.61	59.1 (17.3)	0.61	63.3 (18.5)	0.61	69.0 (20.2)	0.62	14.9	(44.5)
45 (7.2)	4	(0.25)	32.3 (9.5)	0.71	34.1 (10.0)	0.73	35.7 (10.5)	0.75	37.8 (11.1)	0.76	1.6	(4.7)
	6	(0.38)	38.1 (11.2)	0.67	40.5 (11.9)	0.68	42.7 (12.5)	0.69	45.5 (13.3)	0.71	4.1	(12.2)
	8	(0.50)	41.9 (12.3)	0.65	44.8 (13.1)	0.66	47.5 (13.9)	0.66	51.1 (15.0)	0.68	7.0	(20.9)
	10	(0.63)	44.4 (13.0)	0.64	47.8 (14.0)	0.64	50.9 (14.9)	0.65	55.1 (16.2)	0.66	10.5	(31.4)
	12	(0.76)	46.0 (13.5)	0.63	49.8 (14.6)	0.64	53.3 (15.6)	0.64	58.1 (15.6)	0.65	14.7	(43.9)
50 (10)	4	(0.25)	26.7 (7.8)	0.78	28.3 (8.3)	0.80	29.8 (8.7)	0.81	31.9 (9.3)	0.83	1.6	(4.7)
	6	(0.38)	31.0 (9.1)	0.73	33.0 (9.7)	0.74	34.9 (10.2)	0.76	37.5 (11.0)	0.77	4.1	(12.2)
	8	(0.50)	33.8 (9.9)	0.70	36.2 (10.6)	0.71	38.5 (11.3)	0.72	41.5 (12.2)	0.74	6.9	(20.6)
	10	(0.63)	35.7 (10.5)	0.69	38.4 (11.3)	0.69	41.0 (12.0)	0.70	44.5 (13.0)	0.72	10.4	(31.0)
	12	(0.76)	37.0 (10.8)	0.68	40.0 (11.7)	0.68	42.8 (12.5)	0.69	46.7 (13.7)	0.70	14.5	(43.3)
Minimum No. of Outlets			27		30		33		37			

*Entering Air Temperature 80°F (26.7°C) dry bulb / 67°F (19.4°C) wet bulb

UPC-56B/57/58 Round Outlets

Application

The *Unico System* Supply Outlets are used to terminate and anchor the Supply Duct to a ceiling, floor, or wall and to provide quiet delivery of high velocity air to the conditioned space. The 0.25-inch (6 mm) raised face plate is the only part visible in the room. Unico round outlets are available in a variety of colors and materials as shown on page 2. The standard Supply Outlet (UPC-56B) comes in white plastic.

The wood faced outlet (UPC-57) is identical in size to the standard outlet except for the unfinished solid wood face, which can be stained and finished to match your existing floor. The last two spaces (XX) in the part number for the wood outlet designate the wood type. Wood outlet faces are offered in a variety of wood types.

For use in vaulted ceilings, Unico offers the UPC-58-1-XX outlet which includes an angled face. The outlet is available with the faceplate angled at either 15º or 25º.

All outlets can be painted or stained to match any décor and the UPC-56B and UPC-58 are available in black, brass, or chrome along with the standard white. UPC-56B/57 are shipped with toggles and screws. Standard installation and outlet kits include the white UPC-56B outlet.

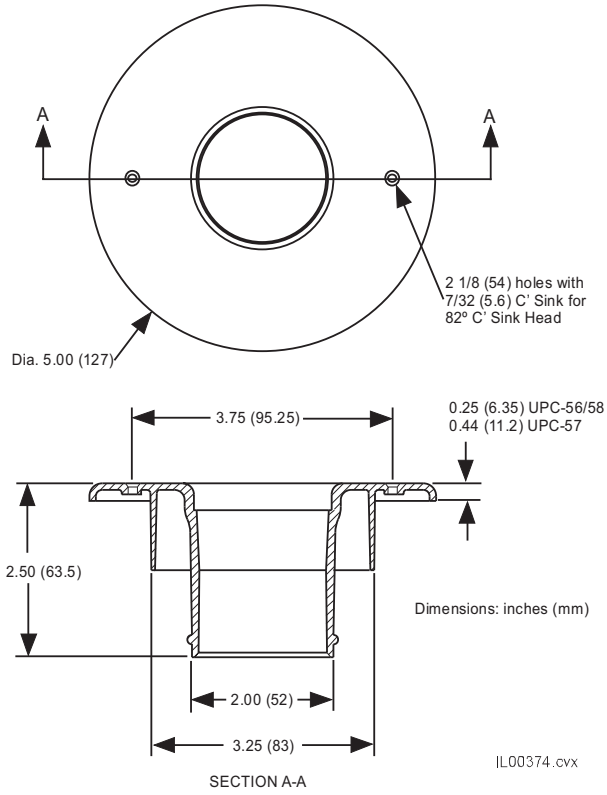
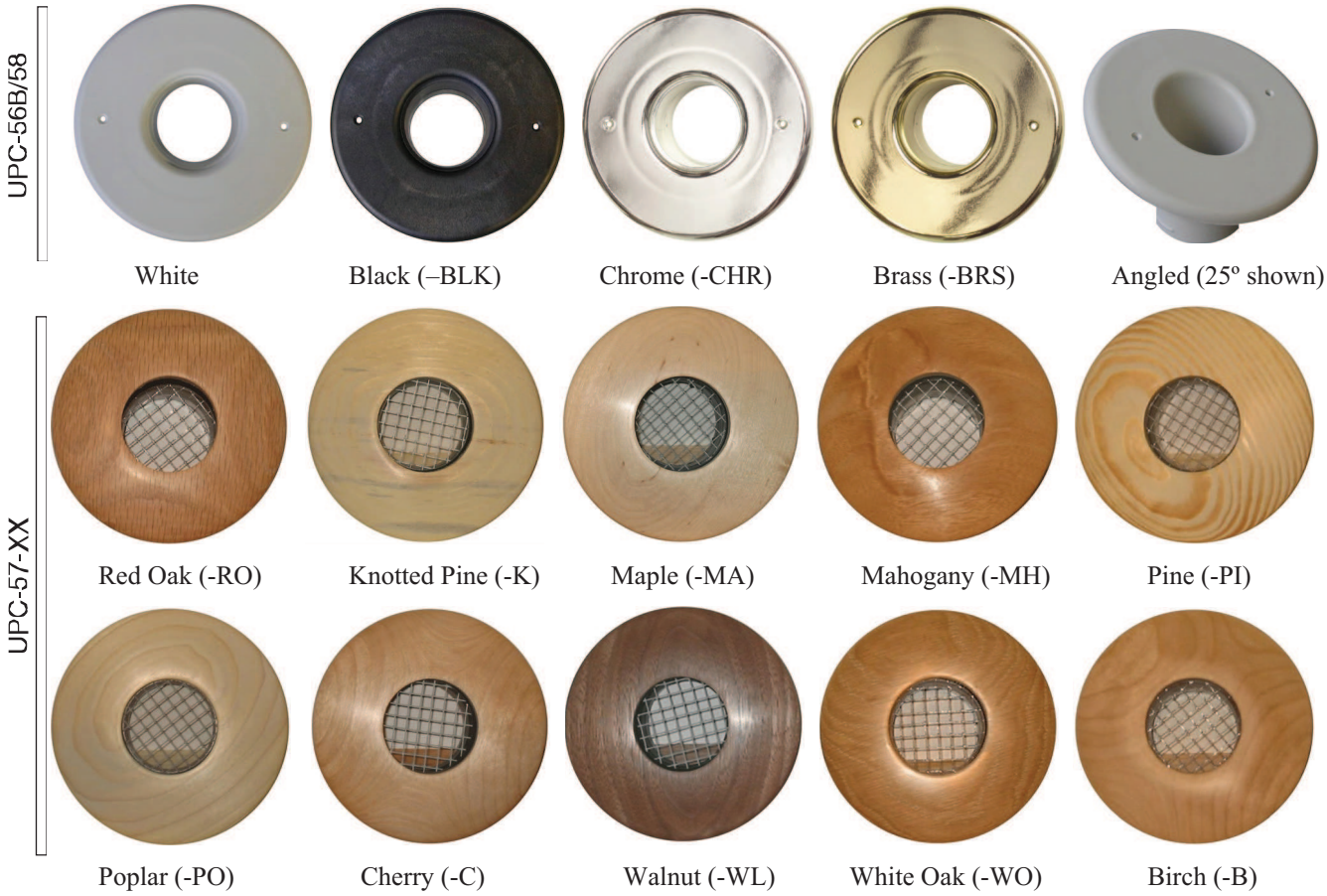


Figure 2. Supply Outlet Dimensions

Unico Outlets are available in the following optional finishes:



UPC-66, UPC-67A, and UPC-68

Parts included:

(1) insulated slotted outlet (90º or straight)

(1) decorative trim plate with fasteners

(1) mounting bracket and rails (UPC-66, UPC-67A, and UPC-68)

(1) clamp, sound attenuator

NOTE: UPC-67 replaced by UPC-67A which includes mounting bracket and rails.

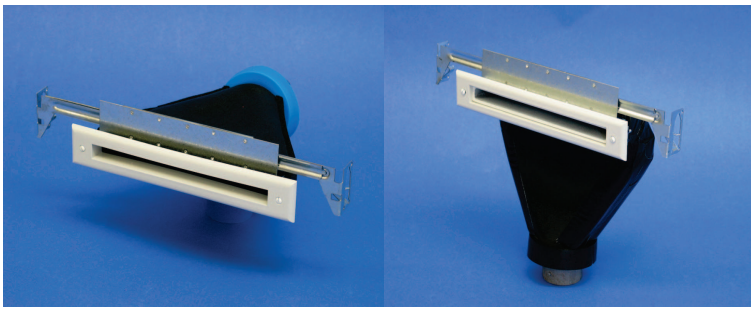


Figure 1. UPC-68 (left) and UPC-66 Shown with Trim Plate, Mounting Bracket, and Hanger Rails

Note — Specifications, ratings, and dimensions subject to change without notice.

Application

In addition to the round outlets, Unico also manufactures rectangular outlets. The rectangular outlets feature a narrow width slot that gives a better appearance in a sidewall installation. There are four (4) different types of slotted outlets. The type of outlet not covered by this bulletin is connected directly to the plenum and is described in Bulletin 20-58. This bulletin covers the three outlet types which are used in conjunction with the Sound Attenuator supply tubing.

Figure 2. Typical Wall Installation, 90º Outlet

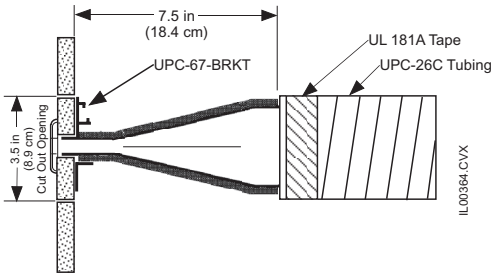


Figure 4. Existing Wall Cut-out Opening, Straight Outlet

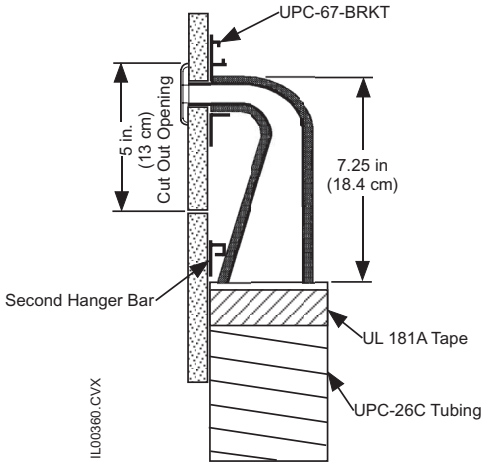


Figure 3. Existing Wall Cut-out Opening, 90º Outlet

UPC-101 Slotted Outlet Plenum Kit

The *Unico System*
specially designed to deliver air directly from the main plenum into a room. It is very
to run supply tubing and the plenum is covered by a soffit, or when exposed ductwork is utilized. It comes standard with a white rectangular plastic trim plate with a slotted opening for the nozzle portion of the outlet. The trim plate is the only part that is seen in the space, and can be painted to match any decor.

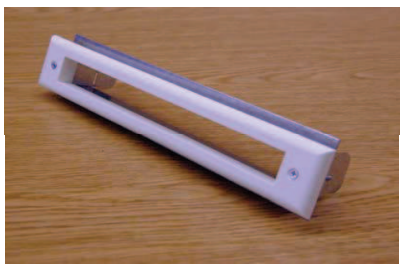
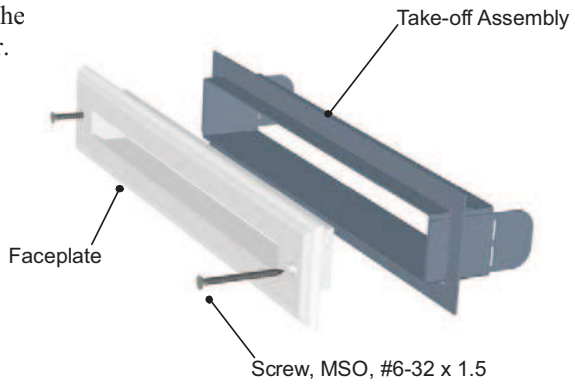
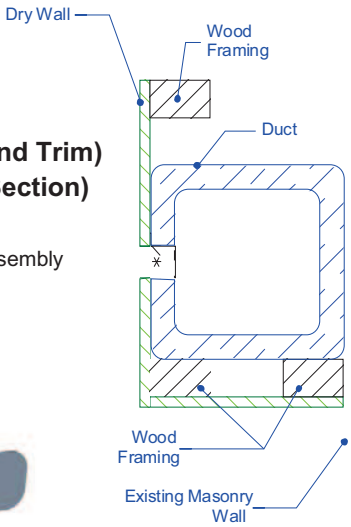
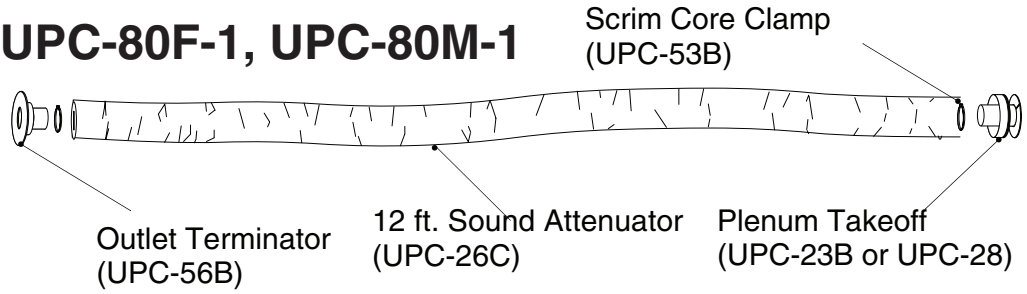


Figure 1. Slotted Outlet and Trim) Dimensions and Cross-Section)





UPC-80F-1, UPC-80M-1



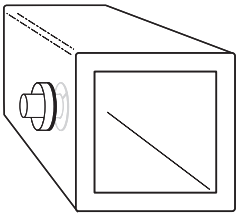


Figure 1. Plenum Takeoff

Packing List —

Each kit contains the following:

1 — 12 ft. (3.6 m) Insulated Attenuator tubing (UPC-26C)
1 — Supply Outlet Terminators (UPC-56B)
2 — Toggles and screws (UPC-51)
1 — Winter Shutoff plugs (UPC-42)
2 — Scrim core clamps (UPC-53B)
2 — Aluminum core clamps, *black* (UPC-52)
1 — Coupling with tape rings (UPC-38)
1 — Takeoff balancing cap, either 15, 35, or 50 percent reduction

UPC-80F-1 also includes:

1 — UPC-23B Fiberglass Takeoff

UPC-80M-1 also includes:

1 — UPC-28 Metal Takeoffs with tape ring and gasket

Application. The ***UNICO SYSTEM***® sound attenuator tubing is supplied in 12-ft (3.6-m) lengths for branch runs between 5 and 12 ft (1.3 to 3.6-m). The attenuator tubing is sold in kits and include all the necessary components to complete a duct run from the plenum to the conditioned space. For branch runs over 12 ft, use at least a 3-ft (1-m) sound attenuator (UPC-26C) coupled to the aluminum core supply tubing (UPC-25).

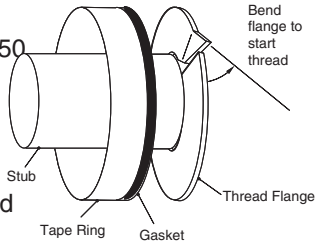


Figure 2. Spin-In Takeoff 1" Pre Insulate Duct

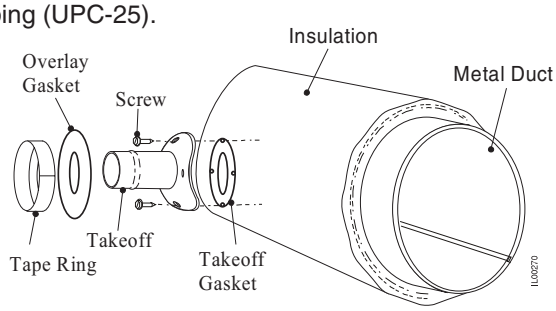
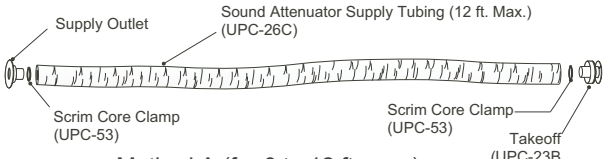


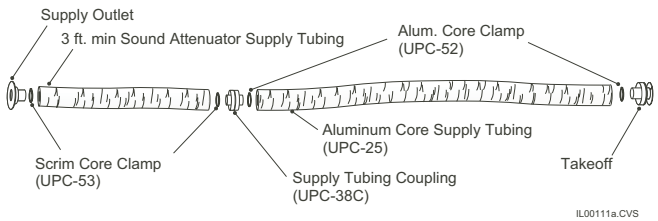
Figure 3. Metal Takeoff Installation

General

The Unico System aluminum supply tubing is a 2-inch (51 mm) Flexible Air Duct. It provides an insulated vapor barrier to prevent condensation from forming on the outside of the duct. However, the aluminum supply tubing is not designed to reduce the high velocity air noise. Therefore, it is essential to use the UPC-26 sound attenuator at the end of every branch duct to prevent unwanted noise.



Method A (for 6 to 12 ft. runs)



Method B (for 6 to 50 ft. runs)

Application of Rigid Attenuators

The *Unico System* rigid sound attenuators are designed for close-coupled applications where it is desired to attach the outlets as close as possible to the plenum. They are ideal for older, historic buildings and churches, where the plenum may be located along the wall with the outlets pointed up or down.

Filter Selection

To facilitate filter selection for the standard *Unico System* return air filter grille see Table 2. This table provides the acceptable resistance for five (5) different sizes of filter that fit into the Unico return air filter grille at various design airflows. Since these operate at velocities different from the test value of 300 ft/min (1.52 m/s) the acceptable resistance can be higher for the lower velocities as shown in Table 2. If a selected filter exceeds the acceptable resistance either it should not be used or in some cases a larger filter can be used.

Disposable Filters

These are the standard filters supplied with Unico filter grilles. These are less efficient filters and the homeowner should replace them frequently depending on system usage. They are more frequently referred to as disposable panel filters. Media typically is fiberglass that can vary in density and thickness (e.g. ½-inch, 1-inch or 2-inch). The thicker and denser filters provide higher arrestance and are more efficient but impose greater pressure drop. The currently available standard panel filters are likely to range from 20-50% arrestance with resistance of .04 to .07 IWC (10 to 18 Pa) and should have acceptable pressure drop for all air handlers at any airflow (see Table 2).

Washable Filters

Typically these filters have aluminum mesh or steel media and are marginally acceptable. The resistance may vary from .04 to over .10 IWC (10 to over 25 Pa) with arrestance in the range of 54-75%. Use Table 2 to screen for acceptable models based on resistance and use Table 3

Pleated Higher Efficiency Filters

These filters have an extended surface area through a series of pleats. As the number of pleats increases for each foot of face area the efficiency will increase but so will the pressure drop. These are available from several manufacturers and as with the previous filter categories they should be screened using Table 2 to find ones that have acceptable resistance for the 1-inch thick panel type models to fit into the standard filter grille. Then use Table 3 to determine what larger area is needed when resistance is greater than the acceptable limit.

Models	Return Duct ID inches (mm)	Standard Filter Size Inches (mm)	Maximum Airflow CFM (l/s)
1218	12 (305)	14 x 20 (356 x 508)	400 (189)
2430	14 (356)	14 x 25 (356 x 635)	600 (283)
3642	18 (457)	14 x 30 (356 x 762)	1000 (472)
4860	20 (508)	20 x 30 (508 x 762)	1250 (590)
		24 x 30 (610 x 762)	

Table 1. Return Duct, Filter Size and Airflow Specifications

Air Handler Model Filter Size inches (mm)	Design Airflow CFM (l/s)	Velocity for Std. Filter Size fpm (m/s)	Acceptable Resistance IWC (Pa)
M1218 14 x 20 (356 x 508)	200 (94.4)	102 (0.518)	.236 (59)
	300 (142)	154 (0.782)	.156 (39)
	400 (189)	206 (1.05)	.117 (29)
	500 (236)	257 (1.31)	.093 (23)
M2430 14 x 25 (356 x 635)	400 (189)	165 (0.838)	.145 (36)
	500 (236)	206 (1.05)	.117 (29)
	600 (283)	247 (1.25)	.097 (24)
	700 (330)	288 (1.46)	.083 (21)
M3642 14 x 30 (356 x 762)	700 (330)	240 (1.22)	.100 (25)
	800 (378)	274 (1.39)	.088 (22)
	900 (425)	309 (1.57)	.077 (19)
	1000 (472)	343 (1.74)	.070 (18)
M4860 20 x 30 (508 x 762)	1000 (472)	240 (1.22)	.100 (25)
	1100 (519)	264 (1.34)	.091 (23)
	1200 (566)	288 (1.42)	.083 (21)
	1300 (613)	312 (1.58)	.077 (19)
M4860 24 x 30 (610 x 762)	1000 (472)	200 (1.02)	.120 (30)
	1100 (519)	220 (1.12)	.109 (27)
	1200 (566)	240 (1.22)	.100 (25)
	1300 (613)	360 (1.32)	.092 (23)

Table 2. Acceptable Resistance for Unico Air Handlers

Electronic Air Cleaners

These are available as ceiling filter grille type or duct mounted type. Where the central single return is being used the Unico filter grille can be replaced with ceiling mounted type Electronic Air Cleaners.

Electrostatic Filters

These filters are made with varying layers of media. The higher the efficiency the greater the pressure drop. Very few are available that will permit using the standard size filter grille. See Table 7 for a listing of the models having lower resistance. This table shows some models that have higher resistance than is acceptable as per Table 2 .

Table 3. Filter Area for Various Filter Initial Resistance Ratings per ASHRAE Standard 52

Air Handler Model Filter Size inches (mm)	Design Airflow CFM (l/s)	Filter Resistance Rating per ASHRAE Std. 52, IWC (Pa) @300 ft/min (1.52 m/s)						
		0.05 (12)	0.07 (17)	0.08 (20)	0.1 (25)	0.12 (30)	0.15 (37)	0.2 (50)
		Required Filter Area, square inches (square cms) for Resistance						
M1218 14 x 20 (356 x 508)	200 (94.4)	76 (490)	90 (581)	96 (619)	108 (697)	118 (761)	132 (852)	152 (981)
	300 (142)	114 (735)	135 (871)	144 (929)	161 (1039)	176 (1135)	197 (1271)	227 (1465)
	400 (189)	152 (981)	179 (1155)	192 (1239)	215 (1387)	235 (1516)	263 (1697)	303 (1955)
	500 (236)	190 (1226)	224 (1445)	240 (1548)	269 (1735)	294 (1897)	329 (2123)	379 (2445)
M2430 14 x 25 (356 x 635)	400 (189)	152 (981)	179 (1155)	192 (1239)	215 (1387)	235 (1516)	263 (1697)	303 (1955)
	500 (236)	190 (1226)	224 (1445)	240 (1548)	269 (1735)	294 (1897)	329 (2123)	379 (2445)
	600 (283)	228 (1471)	269 (1735)	288 (1858)	322 (2077)	353 (2277)	395 (2548)	455 (2935)
	700 (330)	266 (1716)	314 (2026)	336 (2168)	376 (2426)	411 (2652)	460 (2968)	531 (3426)
M3642 14 x 30 (356 x 762)	700 (330)	266 (1716)	314 (2026)	336 (2168)	376 (2426)	411 (2652)	460 (2968)	531 (3426)
	800 (378)	304 (1961)	359 (2316)	384 (2477)	430 (2774)	470 (3032)	526 (3394)	606 (3910)
	900 (425)	342 (2206)	404 (2606)	432 (2787)	484 (3123)	529 (3413)	592 (3819)	682 (4400)
	1000 (472)	380 (2452)	449 (2897)	480 (3097)	537 (3465)	588 (3794)	658 (4245)	758 (4890)
M4860 20 x 30 (508 x 762) 24 x 30 (610 x 762)	1000 (472)	380 (2452)	449 (2897)	480 (3097)	537 (3465)	588 (3794)	658 (4245)	758 (4890)
	1100 (519)	418 (2697)	494 (3185)	528 (3406)	591 (3813)	647 (4171)	724 (4668)	834 (5378)
	1200 (566)	456 (2942)	538 (3474)	576 (3716)	645 (4159)	705 (4550)	789 (5092)	909 (5867)
	1300 (613)	494 (3187)	583 (3764)	624 (4026)	698 (4505)	764 (4930)	855 (5517)	985 (6356)

Bulletin 30-39/ June 2010

TheUnico S.M.A.R.T. Control Board (SCB) :
The SCB control board is available as part of the blower assembly or as part of retrofit kit that includes the motor and blower wheel.

Scope

The SMART control board provides system control for Unico air handlers with EC motors. The control board comes with software and cable to connect to a personal computer (Windows XP or Vista) which allows the user to set the precise airflow.

Features

Congratulations on your purchase on the finest and most versatile fan control on the market. This control board is only compatible with the Unico Electronically Commutative Motor (ECM). The control board comes standard with the following features.

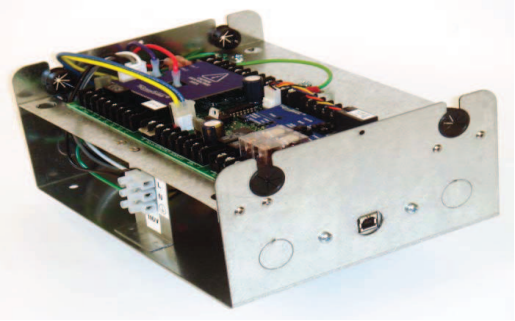
Multiple configurations. Compatible with refrigerant-cooling (AC) systems; refrigerant-heating (heat-pump) systems; chilled water systems, including all UniChiller and UniChillerRC products, hot water systems, electric heat modules, and just about every practical combination of them.

Soft-start/Soft-stop. For the ultimate in quiet, the control board will slowly ramp up to speed when it starts and slowly ramp down when it shuts off (total ramp time 45 seconds).

Ventilation Mode. The SCB is pre-configured to provide ventilation air at 50 percent of the high cool airflow rate.

Simplified Wiring. The control box was developed with the contractor in mind. All wiring terminals are clearly labeled and are designed for point-to-point wiring (one wire per terminal). In addition, we added a feature that allows you to make your terminal connects THEN slip the wire cable into the slotted bushing. Never again, will you have to disconnect and re-wire the board because the cable was not pre-inserted through the bushings.

Accessories. The control board provides separate relays and contacts to energize a separate Electronic Air Cleaner (EAC) or UV light. We also provide a relay to energize a humidifier with a separate humidistat input for proper control. We even provide a feature to allow the humidistat to control the fan so that humidity can be added even if the fan is not already on. And, of course, the control is smart enough to sense when the system is trying to cool, so that humidity is not added if in cooling mode.



Designed for the Unico Electric Heat Module. When using the Unico Electric Heat Module with the Unico heat pump, we require that third step of electric heaters is not energized at the same time as the electric heat. Previously, we required that a field installed relay or thermostat be installed to prevent this from occurring. The control box provides this feature, saving both time and costs. At the same time, the control board is designed for multiple stage thermostats to gradually turn on the electric heat after the heat pump; thereby, improving the efficiency of the heat pump while maintaining the greatest capacity.

Designed for the UniChillerRC. The control is designed to operate the Chiller from the thermostat. And, for multiple thermostat systems, the control boards can communicate, making one the “Leader” the others “Followers” for the best system control available. The board, then, knows whether the chiller is making hot or cold water and turns on the blower as appropriate.

Designed for Hot Water Heating systems. The control allows you to select whether the hot water heating is primary, secondary or emergency heat for single or multi-staged systems. Also, a timer function is included to operate the hot water pump when used with potable water ‘combo’ systems on a periodic basis; this prevents the water from becoming stagnant over time.

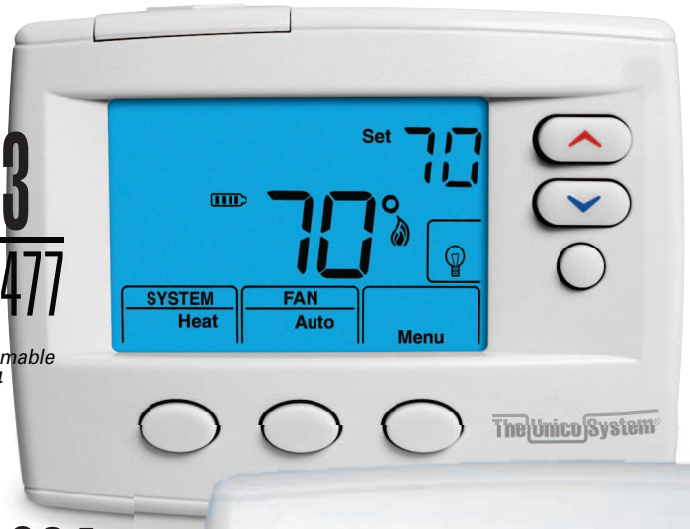
2-Speed condenser Compatibility. The SCB is pre-programmed to operate at 75% of full speed during low stage operation for heating or cooling. This may be modified by using the ECM Config software.

Quality Design and Manufacture. The board itself is made from high quality electronic parts. The board includes a conformal coating to eliminate problems with humidity, moisture, and dust. It is resistant to high voltage discharges (lightening resistant, not lightening proof – which, of course, nothing is!). It is fully certified to UL standards and listed as part of the Unico Blower Module with ETL. Every board is fully tested.

A00915-G03

White-Rodgers 1F80-0477

Single Stage
5/1/1, 5/2 Day, or Ø Programmable
Includes Wall Plate F61-2634



- Hardwired or Battery Powered
- Button or Touchscreen User Interface
- Single Stage or Multi-Stage

±1°F ACCURACY
OPTIMUM COMFORT AND PERFORMANCE

ENERGY STAR

Soft-touch Buttons
(A00915-G03, A00915-G04)

A00915-G04

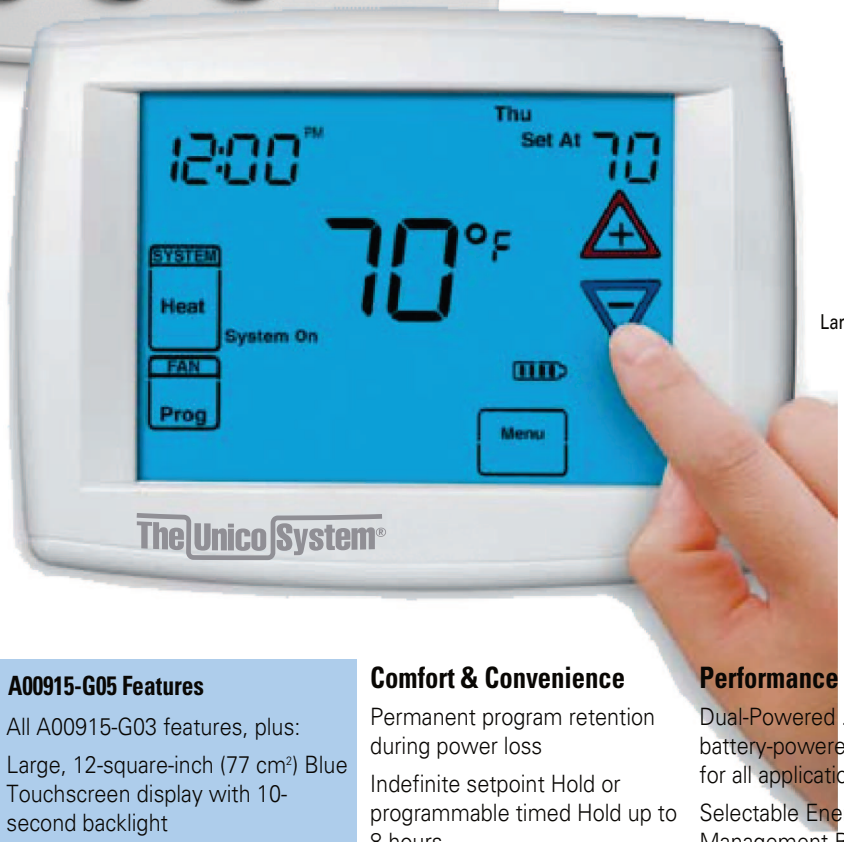
White-Rodgers 1F85-0478

Multi-Stage
5/1/1, 5/2 Day, or Ø Programmable
Includes Wall Plate F61-2634

A00915-G05

White-Rodgers 1F95-1292

Universal Single or Multi-Stage Touchscreen
7 Day, 5/1/1, or Ø Programmable



Large Touch Screen
(A00915-G05)

A00915-G03/-G04 Features

- Large, 4-square-inch (26 cm²) Blue display with easy-to-see characters
- Quick one-button programming (See Automatic Schedule section in installation instructions)
- Configures as manual heat/cool, auto changeover, heat only, or cool only
- Exclusive Cool Savings™ feature saves energy during peak A/C demand periods
- Hydronic 2 or 3 wire applications
- Three anticipation settings
- Exclusive battery power monitor
- Longer battery life
- Easy-access battery compartment
- 5-year warranty

A00915-G05 Features

All A00915-G03 features, plus:

- Large, 12-square-inch (77 cm²) Blue Touchscreen display with 10-second backlight
- Dual fuel heat pump control
- Remote sensing indoor or outdoor and at the thermostat
- Programmable fan
- Circulator fan cycling
- Automatic daylight savings option

Programming

- Several programmable choices
- 4 time and 4 temperature settings per program (heat & cool)
- Energy savings up to 33%
- Patented pre-programmed software simplifies time and temperature programming

Comfort & Convenience

- Permanent program retention during power loss
- Indefinite setpoint Hold or programmable timed Hold up to 8 hours
- Air filter change indicator (optional)
- Simple "setup" menu to activate optional features
- Temporary temperature override
- Soft-touch keypad (A00915-G03/-G04)
- Maintains room temperature differential within 1°
- Display temperature recalibration (+/- 4°)

Performance

- Dual-Powered ... choice of battery-powered or hardwired, for all applications
- Selectable Energy Management Recovery
- Meets ENERGY STAR® Specifications
- Meets California Building Code, Title 24
- Fast (FA) or slow (SL) heating cycle anticipation
- Easy-to-wire terminal block
- Compressor lockout protection
- Millivolt compatible
- Electric heat option

Display

- Large displays for easier reading
- Lighted display for easier low-light viewing

For Additional Information
Visit www.white-rodgers.com

A01514-G01 and –G02

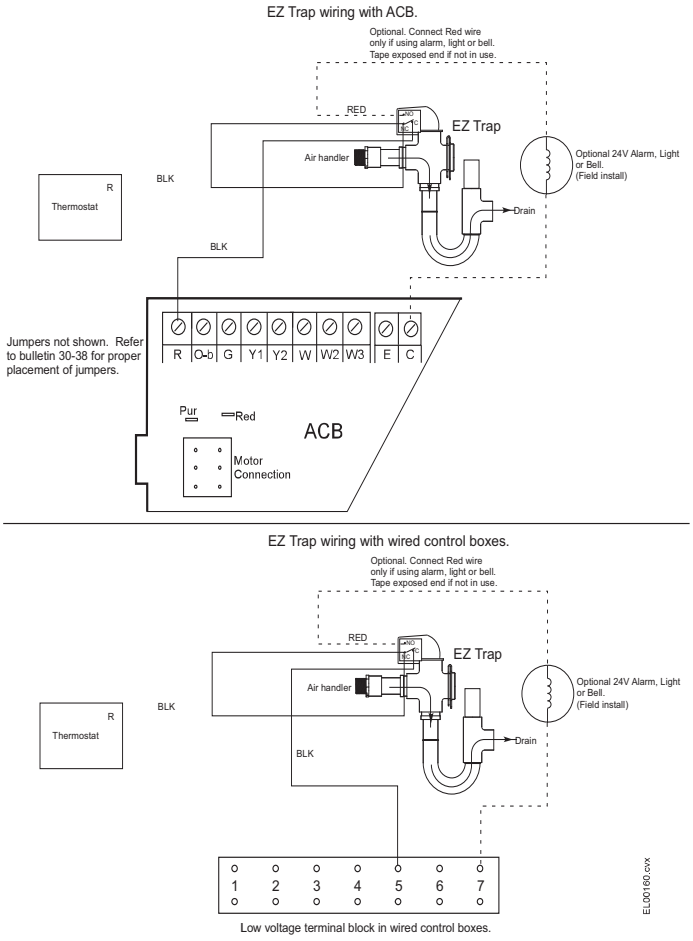
A00924-G05 & G06

The Unico Condensate U-trap (A00924-G05 and A00924-G06) features a clear, heavy wall seamless trap that is easy to visually inspect for clogs. The U-trap, specially made for the Unico System, includes an extra deep 2.5 inch (64 mm) trap to handle the higher static pressures.

The U-trap features a 2.5" long trap, a clean-out extension pipe, two tees to accommodate any piping arrangement, and the necessary fitting to connect to the drain pan. The Unico Condensate Waterless trap (A01514-G01 and A01514-G02) features a clear trap assembly that does not hold water which helps prevent freeze bursting in cold climate conditions.

The float switch is used on both the U-trap (A00924-G05 and G06) and the Waterless trap (A01514-G01 and G02) to prevent overflow of the condensate drain pan if a clog occurs.

All U-traps and waterless traps come with a float switch that can be wired through a homeowner's thermostat and a Unico air handler control box. An optional field installed alarm or bell can be wired in line with the float switch and the Unico air handler control box to give additional notification to the homeowner that there is a problem with the U-trap or waterless trap. See figure 4 for wiring details.

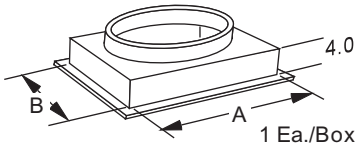


. Wiring of the float switch

Return Grille & Filter

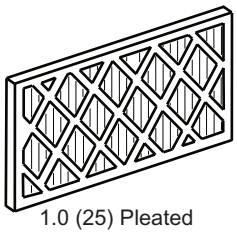
Includes throwaway filter, two duct bands, and clips.

Rough-in dimensions are shown.

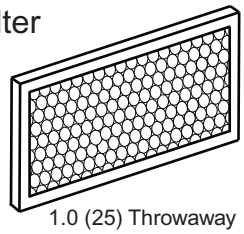


1 Ea./Box

Air Filter

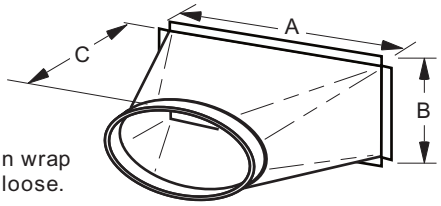


1.0 (25) Pleated



1.0 (25) Throwaway

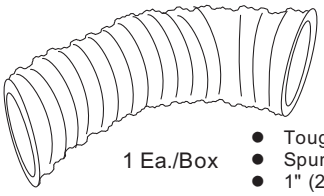
Adapter, Return Air, Cooling Module



Includes insulation wrap shipped loose.

1 Ea./Box

Return Air Duct

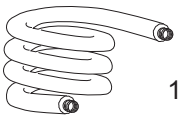


1 Ea./Box

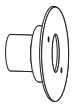
- Tough Aluminized outer mylar wrap
- Spun-bonded nylon and helical wire core
- 1" (25 mm) Fiberglass insulation, R-4.2

Outlet Kits (1 Outlet)

- UPC-80F-1 Outlet Kit for 1-inch Fiberglass Plenum
- UPC-80M-1 Outlet Kit for Metal Plenum



1 — 12 ft. (3660 mm)Sound Attenuator



1 — Supply Outlet (White)

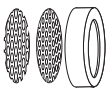
2 — Scrim Core Clamps (Stamped '575')

2 — Supply Tubing Clamps (Stamped '605', Painted Black)

2 — Toggles and Screws

1 — Winter Supply Shutoff

1 — Coupling with Tape Rings



1 — Balancing Orifice Kit for one outlet, includes (1) balancing cap, (1) 35% reducer disk, and (1) 50% reducer disk

UPC-80F only

1 — Fiberglass Spin-In Take-off

UPC-80M only

1 — Metal Take-off with gasket and tape ring

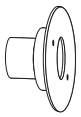
Installation Kits (6 or 8 Outlets)

UPC-89F-6/8 Installation Kit for 1-inch Fiberglass Plenu

UPC-89F-1.5-6/8 Installation Kit for 1.5-inch Fiberglass Plenum

UPC-89M-6/8 Installation Kit for Metal Plenum

Includes



6 or 8 — Supply Outlets (White)

12 or 16 — Scrim Core Clamps (Stamped '575')

12 or 16 — Supply Tubing Clamps (Stamped '605', Painted black)

12 or 16 — Toggles and Screws

1 — Balancing Orifice Kit for one outlet, includes (1) balancing cap, (1) 35% reducer disk, and (1) 50% reducer disk

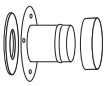
6 or 8 — Winter Supply Shutoffs

6 or 8 — Couplings with Tape Rings

UPC-89F only

6 or 8 — Fiberglass Spin-In Take-offs for 1" (25.4 mm) or 1.5" (38.1 mm) Ductboard

UPC-89M only



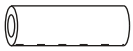
6 or 8 — Metal Take-offs with gasket and tape ring

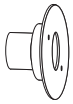
All dimensions are in inches (mm) unless otherwise noted.

NOTE — Specifications, Ratings, and Dimensions are subject to change without notice.

Outlet Kits, Short (5 Outlets)

- UPC-84-5 Outlet Kit for 1-inch Fiberglass Plenum
- UPC-85-5 Outlet Kit for Metal Plenum


5 — 12" (300 mm) Rigid Attenuators


5 — Supply Outlets (White)


5 — Winter Supply Shutoffs


10 — Toggles and Screws

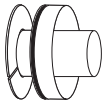
UPC-84-5 only


5 — Fiberglass Spin-In Take-offs

UPC-85-5 only


5 — Metal Take-offs with gasket and tape ring

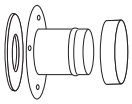
Spin-In Takeoff



Use UPC-23B for 1-inch fiberglass
Use UPC-22 for 1.5-inch fiberglass

UPC-22/23B 1 Ea./Box

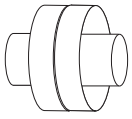
Metal Takeoff Pkg



Includes tape ring and gasket

UPC-28 1 Ea./Box

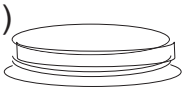
Supply Duct Coupling



ncludes supply tubing clamps and ape rings

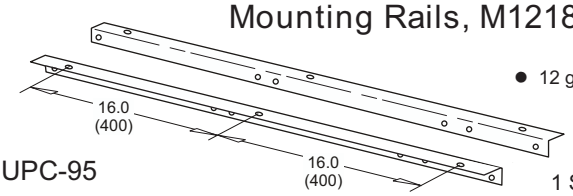
UPC-38C-10 10 Ea./Box

Winter Shutoff (2")



UPC-42-20 20 Ea./Box

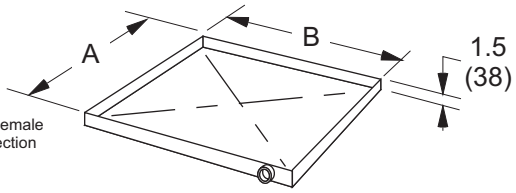
Mounting Rails, M1218



- 12 ga. steel

UPC-95 1 Set/Box

Secondary Drain Pan



• 3/4-inch (19 mm) Female PVC Socket Connection

Outlet Balancing Orifice Package


15% Reduction (1-7/16" (36mm) hole) — 5 / Pkg


35% Reduction (1-1/8" (28 mm) hole) — 5 / Pkg


50% Reduction (15/16" (23 mm)hole) — 5 / Pkg


Winter Shutoff (2-1/8" (53 mm)) — 15 / Pkg

UPC-36-15

Takeoff Balancing Orifice Package

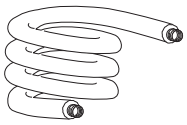

UPC-30 15% Reduction (Cap) — 15 / Pkg


UPC-31 35% Reduction (Perf. disk) — 5 / Pkg


UPC-32 50% Reduction (Perf. disk) — 5 / Pkg

UPC-35-15

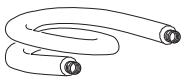
Supply Tubing



- Tough Aluminized mylar outer wrap
- Two-ply aluminum core
- Fully insulated, (R-4.2 equivalent)
- 25 ft (7625 mm) lengths
- Certified as an Air Duct per UL181

2“ (50 mm) ID

Sound Attenuator

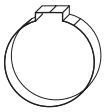


- Tough Aluminized mylar outer wrap
- Spun-bonded nylon and helical wire core
- Fully insulated
- 12 ft (7625 mm) lengths
- Certified as an Air Duct per UL181

2" ID (50 mm)

6 Ea./Box

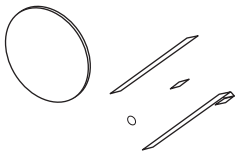
Supply Tubing Clamp



For alum. core
Stamped '605'
Painted black

UPC-52-50 50 Ea./Box

Outlet Deflector

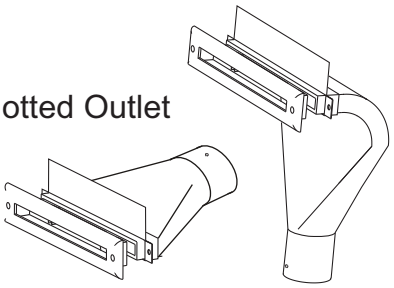


UPC-45-5
5 Ea./Box

UPC-66 (Metal)
UPC-67A (Plastic)
UPC-68 (Plastic)

- factory insulated
- fits in standard 2 x 4 construction
- includes mounting bracket wit hanger bars
- includes a white plastic trim plate, also available in metallic silver, brass, or unfinished wood.

Slotted Outlet



UPC-68 UPC-66/67A

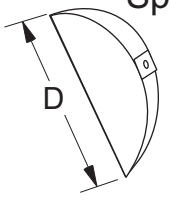
1 Ea.\ Box

Scrim Core Clamp

For sound atten. core
Stamped '575'

UPC-53-50 50 Ea /Box

Splitter Vane



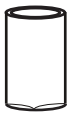
Includes screws and washers.

4 Ea./Box

Clamp Pliers

UPC-54 1 Ea./Box

2" Hole Cutter



UPC-55-5 5 Ea./Box

Accessories:
Mounting Bracket: UPC-67-BRKT

1.0 GENERAL

The indoor air-handling unit and mini-duct, high-velocity duct system shall be designed to deliver the minimum airflow required to meet the specified capacity of the equipment. The equipment and duct design shall comply with the written definition of a Small-Duct High-Velocity system per ARI 210/240.

Materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacturing of such products, which are of similar material, design and workmanship.

The manufacturer shall warrant against defects in materials and workmanship for a period of one year on all parts.

The system model number shall be _____.

2.0 DESIGN REQUIREMENTS

2.1 General

Each system shall be designed to deliver at least the minimum airflow required to produce the required capacity for heating or cooling, whichever is greater. There shall be some means of adjusting the airflow, either by changing fan speeds, or adding restriction to the duct system by means of a restricter plate or balancing orifices.

The system shall have a total cooling capacity of _____ BTU/HR (kW) with a sensible heat ratio less than 0.65 based on the entering air condition of 80°F (26.7°C) dry bulb, and 67°F (19.4°C) wet bulb.

The system shall have a total heating capacity of _____ BTU/HR (kW), based on the entering air condition of 70°F (21.1°C) dry bulb.

2.2 Special Requirements

2.2.1 Refrigerant Systems

Each system shall be capable of delivering at least 250 CFM per nominal ton of capacity (33 L/s per nominal kW).

The system shall conform to ARI 210/240 and be rated for a minimum Seasonal Energy Efficiency (SEER) of 10.0. Heat pump models shall be rated with minimum Heating Seasonal Performance Factor (HSPF) of 6.8.

2.2.2 Hydronic Systems

The capacity of the chilled water and hot water coil shall include any temperature rise across the blower and motor.

The chilled water coil cooling capacity shall be based on entering water of _____ °F (°C) at _____ GPM (l/s).

The hot water coil heating capacity shall be based on entering water of _____ °F (°C) at _____ GPM (l/s).

3.0 MECHANICAL EQUIPMENT

The air-handling unit shall be in accordance with UL 1995 (CAN/CSA-C22.2 No. 236). The unit shall include a blower, motor, controls, and heat exchanger. If the total weight of the unit is greater than 100 pounds (45 kg), the unit shall be modular in construction such that the sections are easily joined without special tools.

3.1 Cabinet

The cabinet shall be constructed of 22 gauge galvanized steel and be designed for easy installation and service.

3.2 Blower and Motor

The unit shall be designed for 208-230 volt, 1 phase, and 60 Hz power. The blower motor shall be a permanent split capacitor type with Class B insulation. It shall have permanently lubricated ball bearings and automatic reset thermal overload protection.

The blower shall be direct driven centrifugal type designed for high-pressure applications. The minimum external static pressure shall be 1.2 inches of water (298 Pa). The motor shall mount directly to the blower housing and inlet ring by means of a heavy gauge spider mount that is easily removed for service using a twist-and-lock design.

3.3 Controls

All controls shall be designed for 24 volt. The control panel shall include a 48VA class 2, 24V/208-230V transformer inherently or internally fused. All refrigerant coils shall be protected by a temperature limit control to protect the coil from freeze up. Heat pump coils shall additionally provide a bypass relay to jumper out the anti-frost control during defrost mode. The blower control shall include a low-speed ventilation mode to circulate air without heating or cooling.

A third party low ambient head pressure control shall be installed to maximize system capacity as the outdoor temperature drops. This control shall maintain head pressure by controlling the condenser fan. It shall be compatible with the condenser fan motor.

A Mild Weather Kit Control, Model UPC-65, shall be installed on each heat pump to limit head pressure, preventing nuisance tripping of the compressor high pressure switch when heating is required during warm ambient conditions.

OPTIONAL. The controls shall include a soft-start soft-stop feature; relays for a humidifier, ERV, hot water coil, and chilled water coil; the ventilation mode shall be half speed operate using less than 30% of the full speed power.

3.4 Heat Exchangers

3.4.1 Refrigerant Coil

Refrigerant coils shall have 3/8-inch (9.5-mm) minimum diameter copper tubes with mechanically bonded or soldered aluminum fins. Each coil shall be dehydrated and sealed after testing and prior to evacuation and charging. Each coil shall contain a small nitrogen holding charge less than 10 psig(.70 kg/sq cm).

The coils shall be designed for R22 and R410A refrigerant. Refrigerant metering shall be accomplished with an externally equalized TX valve with threaded connections of either Chatleff or flare type. Heat pump coils shall include an internal or external bypass check valve. Liquid line connection shall be 3/8 inch (9.5-mm) ODF. Suction line connection for 2 to 5 ton systems shall be 7/8 inch (22.2-mm) ODF and 5/8 inch (15.9-mm) ODF for 1 to 1.5 ton systems.

3.4.2 Hydronic Coil

Hydronic coils shall be designed for 150 psig (10.5 kg/sq. cm)at 200°F (93°C). Each coil shall include a vent and a drain plug. The vent plug shall

be at the highest practical point of the coil. The drain plug shall be at the lowest practical point of the coil. Hot water coils shall be installed by sliding into the cabinet for easy installation and service. All water coil connections shall be 7/8 inch (22.2-mm) OD except for the M1218 hot water coil which shall be 5/8 inch (15.9 mm) OD.

3.5 Drain Pan

All cooling coils shall have a stainless steel primary drain pan. The primary drain connection shall be ½ inch (12.7-mm) FPT for units less than 2-ton capacity, and ¾ inch (19.1-mm) FPT for all larger units.

All primary drain pans shall be trapped with a 2.5 inch (64 mm) deep clear trap with removable cleanout caps.

For all installations where an overflow of condensate can cause damage, a secondary drain pan shall be installed under the entire unit with a separate non-trapped drain connection.

3.6 Electric Heater

The electric heater shall have its own separate control box with built-in circuit breakers and safety limits. It shall be _____ kW, 230 volt, 1 phase, 60 Hz. It shall be in its own cabinet and installed in the supply plenum at least 4 feet (122 cm) from any upstream equipment or fitting, and at least 2 feet (61 cm) from any downstream fitting.

The electric duct heater shall be built with ____ stages, with the first stage greater or equal to the other stages. The electric heaters shall be listed per UL 1995. Additionally, the electric heater will have a defrost circuit where one or more stages will be energized during the defrost mode if installed with a heat pump.

4.0 AIR DISTRIBUTION

The air distribution system shall be designed with a pressurized manifold (supply plenum) that feeds 2-inch (50.8-mm) ducts directly into the conditioned space. All ducts and connections shall be designed for 2 inches (50.8-mm) water column static pressure.

A minimum of 6 outlets per nominal ton (3.5 kW) shall be installed. The number and placement of the outlets shall be in accordance with the manufacturer's instructions, based on the room-by-room load analysis. Balancing is accomplished by matching the number of outlets in each room to the required load, using balancing orifices.

Duct insulation R-factor shall comply with the local building code and any BOCA or ICC engineering evaluation reports.

4.1 Plenum

The plenum may be insulated and sealed metal duct or fiberglass duct board. Fiberglass ductboard shall be ___ (1 or 1.5 inches) (25.4, 38 mm) thick. The plenum will be at least 7-inch (17.8-cm) I.D. for any airflow less than 700 CFM (329 L/s), at least 9-inch (22.9-cm) I.D. for any airflow less than 1000 CFM (470 L/s), or 10-inch (25.4 cm) I.D for airflow less than 1250 CFM (589 L/s). The number of elbows and tees shall be kept to a minimum.

4.2 Supply Tubing

The supply tubing shall be a flexible 2-inch (50.8-mm) inside diameter duct, wrapped with fiberglass insulation with an outer reinforced aluminized mylar vapor seal jacket. The inner core shall be two-ply corrugated aluminum. The supply tubing shall conform to UL 181 class 1 air ducts and be so labeled.

4.3 Sound Attenuator

Each duct run shall either terminate with at least 3 feet (0.9 m) of sound attenuator connected to at least 3 ft (0.9 m) of Supply Tubing, or the entire run shall be Sound Attenuator. The sound attenuator shall conform to UL Standard 181 as an Air Duct and be so labeled. It shall be constructed with helical wire and spun-bonded nylon or polyester, wrapped with fiberglass insulation with an outer reinforced aluminized mylar vapor seal jacket.

4.4 Connectors

All connectors shall be metal and have a tape ring or some means of allowing the outer jacket of the tubing to be sealed without compressing the insulation. The 2-inch (50.8-mm) ducting shall connect to metal plenum with a flanged stub using sheet metal screws, or shall connect to fiberglass plenum with a spin-in connection. All plenum connections shall be sealed with a gasket.

Tube-to-tube connectors (couplings) shall also include tape rings. The inner core shall be secured to the connector by means of a hose clamp or sheet metal screw. The outer jacket shall be secured and sealed to the connector tape ring with UL-181A-P aluminum tape or UL-181B duct tape.

4.5 Terminators

Each duct run shall terminate with a one-piece flanged outlet through a 2-inch (50-mm) diameter opening or through a 0.5 inch x 8 inch rectangular opening. All round outlets shall be free of obstructions or grille work unless located in the floor. The round outlets shall have some means of capping to prevent moisture migration during extended periods of non-use in cold weather. The outlets shall be either insulated metal or plastic conforming to a UL 94HB fire rating.

4.6 Balancing

Air balancing shall be accomplished primarily by providing the proper number of outlets in each space. For small rooms, balancing can be fine-tuned with orifices that are installed at the takeoff (plenum) connections.

4.7 Return Air Duct

The return air duct system, including filter, shall be designed for a maximum of 0.15 inches 3.8-mm) static pressure at the required airflow. The return duct must either be an acoustical dampening flex duct, made of fiberglass duct board, or lined with an acoustical or fiberglass lining. In addition, there shall be at least one 90° bend in the duct to prevent line-of-sight from the unit to the return opening. There can be multiple return openings.

5.0 INSTALLATION AND CHECK-OUT

The installation of the equipment shall be in accordance with the equipment manufacturer's instructions and all applicable local codes.

The airflow through the unit must be measured before the ductwork is boxed-in by recording the blower motor amps and voltage and comparing to the amperage charts for the blower. The system balance and total airflow must be verified by recording the airflow output of each outlet with a velocity meter that matches the outlet dimensions or is calibrated for the opening size.

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