Liebert® SRC™

System Design Manual—Mini-Split Cooling System

EMERSON
Network Power

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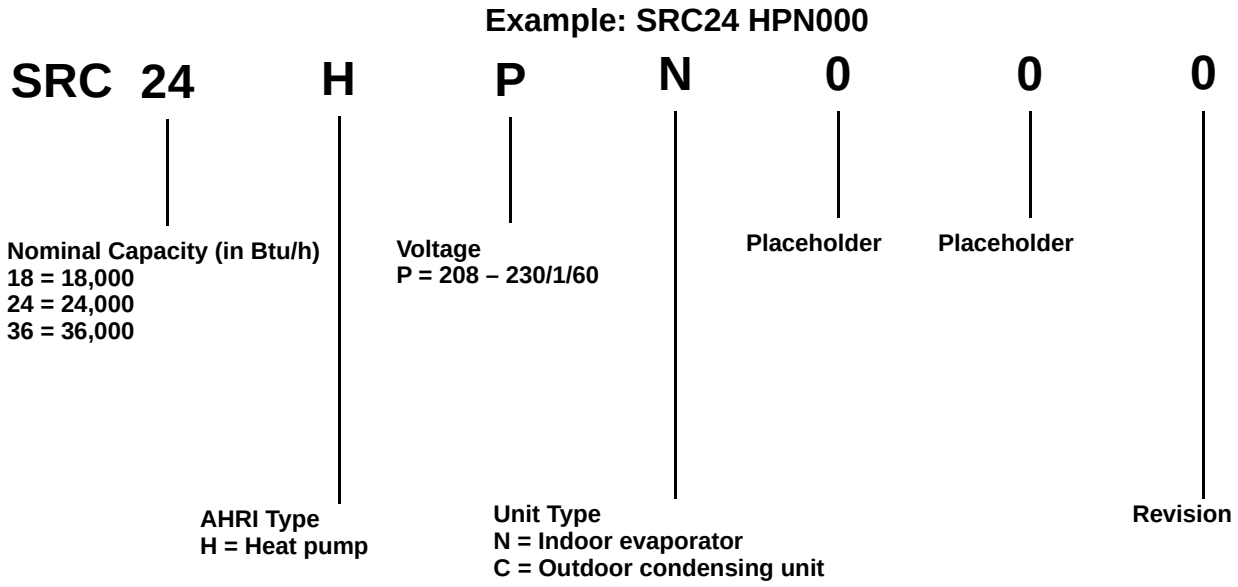
1.0 Model Number and Nomenclature

Figure 1-1 Product Nomenclature



Acronyms

Table 1-1 Acronyms

ABS	Acrylonitrile Butadiene Styrene	H/M/L	High/Medium/Low
AC	Air Conditioner	HVAC	Heating, ventilation and air conditioning
ACP	Advanced control platform	IDU	Indoor unit
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning	ISO	International Organization for Standardization
AWG	American Wire Gauge	kW	kilowatts
BLDC	Brush-less digitally-controlled/direct	LED	Light-emitting diode
Btu/h	British Thermal Units per hour	MBh	Thousands BTUs per hour
BUS	Binary unit system	MCA	Maximum circuit ampacity
CFM	Cubic feet per minute	MOP	Maximum overcurrent protection
COP	Coefficient of performance	ODU	Outdoor unit
CR	Combination ratio	PCB	Printed circuit board
DB	Dry bulb	PCM	Pre-coated metal
dB(A)	Decibels with “A” frequency weighting	PDI	Power distribution indicator
DDOAS	Decoupled dedicated outdoor air	PI	Power input
DO	Digital output	PTAC	Packaged terminal air conditioner
DPST	Double-pole single-throw (switch)	PVC	Polyvinyl Chloride
EEV	Electronic expansion valve	USB	Universal serial BUS
ELF	Equivalent length in feet	VAC	Voltage alternating current
ESP	External static pressure	VAV	Variable air volume
ETL	Electronic Testing Laboratories	VRF	Variable refrigerant flow
HIPS	High-impact Polystyrene	WB	Wet bulb

2.0 Product General Data

2.1 Unit Specifications

Table 2-1 SRC system specifications by model

	SRC18	SRC24	SRC36
Nominal Cooling Capacity (Btu/h)	18,200	22,000	33,000
Cooling Power Input [1] (kW)	1.45	1.7	4.0
Nominal Heating Capacity[1] (Btu/h)	22,000	27,000	35,200
Heating Power Input[1] (kW)	1.76	2.3	3.8
Cooling COP	3.66	3.66	2.40
Maximum Heating Capacity, Btu/h (kW)			
Outdoor 17°F (WB)/Indoor 70°F (DB)	18,040 (5.3)	27,410 (8.0)	35,740 (10.5)
Outdoor 5°F (WB)/Indoor 70° (DB)	15,180 (4.4)	23,690 (6.9)	30,890 (9.1)
Outdoor –4°F (WB)/Indoor 70 °F (DB)	14,740 (4.3)	20,580 (6.0)	26,820 (7.9)
EER	12.6	12.5	8.2
SEER	20.5	21.0	16.5
HSPF	9.7	11	10
Power Supply (V/Hz/∅)	208 – 230/60/1		
Outdoor-unit Operating Range[2]			
Cooling (°F)	14 – 118		
Heating (°F)	–4 to 65	–4 to 75	
Indoor-unit Operating Range			
Cooling (°F)	53 to 75	64 to 90	
Heating (°F)	60 to 86		
Indoor Temperature Setting Range			
Cooling (°F)	64 to 86		
Heating (°F)	60 to 86		
Unit Data			
Refrigerant Type[3]	R410A		
Refrigerant Control	Electronic Expansion Valve		
Indoor Unit Sound Pressure[4] dB(A) (H/M/L/Sleep)	45/40/35/29	49/44/40	
Outdoor Unit Sound Pressure[4] dB(A)	53	55	
Power/Communication Cable[5] (No. x AWG)	4 x 18		

1. Power Input is rated at high speed.
2. Optional low Ambient Wind Baffle Kit allows operation down to 0°F in cooling mode.
3. Take appropriate actions at the end of HVAC equipment life to recover, recycle, reclaim or destroy R410A refrigerant according to applicable regulations (40 CFR Part 82, Subpart F) under section 608 of CAA.
4. Sound Pressure levels are tested in an anechoic chamber under ISO Standard 1996.
5. All power wiring/communication cables are field-supplied and are to be minimum 18 AWG, 4-conductor, stranded, shielded and must comply with applicable local and national codes.
6. Piping lengths are equivalent.

The unit comes with a dry helium charge.

This data is rated 0 ft above sea level with 24.6 of refrigerant liner per indoor unit and a 0 ft level difference outdoor and indoor units.

Cooling capacity rating obtained with air entering the indoor unit a 80°F dry bulb (DB) and 67°F wet bulb (WB) and outdoor ambient conditions of 95°F DB and 75°F WB.

Heating capacity rating obtained with air entering the indoor unit at 70°F DB and 59°F WB and outdoor ambient conditions of 47°F DB and 43°F WB.

Table 2-1 SRC system specifications by model (continued)

	SRC18	SRC24	SRC36
Unit Weights			
Indoor Unit Net/Shipping Weight, lb (kg)	31/36 (14.1/16.3)	40/46 (18.1/20.9)	
Outdoor Unit Net/Shipping Weight, lb (kg)	121/131 (54.9/59.4)	125/133 (56.7/60.3)	
Compressor			
Compressor Type (Qty)	Twin Rotary (1)		
Fan			
Indoor Unit Type (Qty)	Cross Flow (1)		
Outdoor Unit Type (Qty)	Propeller (1)		
Motor/Drive	Brush-less Digitally-controlled/Direct		
Airflow Rate			
Indoor Unit Max/H/M/L (CFM)	735/622/509/399	848/706/530/459	
Outdoor Unit Max (CFM)	2,119		
Piping			
Liquid Line (in., OD)	3/8		
Vapor Line (in., OD)	5/8		
Condensation Line (OD, ID)	27/32, 5/8		
Additional Refrigerant Charge (oz/ft)	0.38		
Pipe Length[6] (Minimum/Maximum) (ft)	9.84/98.4	0/164	
Piping Length[6] (no additional refrigerant, ft)	24.6		
Max Elevation Difference (ft)	49.2	98.4	

1. Power Input is rated at high speed.
2. Optional low Ambient Wind Baffle Kit allows operation down to 0°F in cooling mode.
3. Take appropriate actions at the end of HVAC equipment life to recover, recycle, reclaim or destroy R410A refrigerant according to applicable regulations (40 CFR Part 82, Subpart F) under section 608 of CAA.
4. Sound Pressure levels are tested in an anechoic chamber under ISO Standard 1996.
5. All power wiring/communication cables are field-supplied and are to be minimum 18 AWG, 4-conductor, stranded, shielded and must comply with applicable local and national codes.
6. Piping lengths are equivalent.

The unit comes with a dry helium charge.

This data is rated 0 ft above sea level with 24.6 of refrigerant liner per indoor unit and a 0 ft level difference outdoor and indoor units.

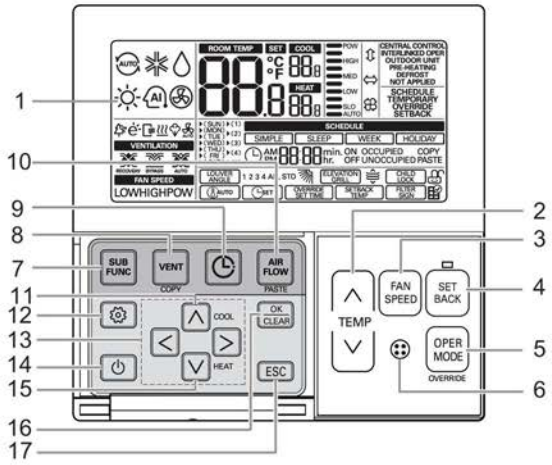
Cooling capacity rating obtained with air entering the indoor unit a 80°F dry bulb (DB) and 67°F wet bulb (WB) and outdoor ambient conditions of 95°F DB and 75°F WB.

Heating capacity rating obtained with air entering the indoor unit at 70°F DB and 59°F WB and outdoor ambient conditions of 47°F DB and 43°F WB.

2.2 Ship Loose Items

- **Wired Wall Display**—Shown in **Figure 2-1**, allows control of indoor unit on/off, operation mode, occupied and unoccupied temperature setpoints, fan speed and air-flow directions for up to 8 indoor units. Programmable schedule with 5 events per day with control of occupied/unoccupied, on/off, mode, setpoints and fan speed. Advanced functions include two setpoint auto-changeover, minimum difference between setpoints, setback and timed override. TABLE lists the functions available at the wall box, the type of function, and the models on which it is available.
  - Maximum wire length = 164 ft
- **Condensate Pump**—Complete with integral float switch, safety switch, pump and motor assembly with a capacity of 1 GPH (3.8 LPH) @ 10 ft (3 m) head.
- **Low Ambient Wind Baffle**—Allows operation of cooling mode down to 0°F. See **Figures 4-7** to **4-9** in **Section 4.0**.

Figure 2-1 Wall display



No.	Description	No.	Description
1	Operation indication	10	Air-flow button
2	Set temperature button	11	Cooling temperature setpoint
3	Fan speed button	12	Function setting button
4	Set back button	13	Up, down, left and right buttons
5	Operation-mode select button	14	On/Off button
6	Wireless thermostat receiver (not included on some models)	15	Heating temperature setpoint
7	Sub function button	16	Set/Cancel button
8	Ventilation button	17	Exit button
9	Reservation button		

Table 2-2 Thermostat functions available at the wall display

Category	Function	SRC18	SRC24	SRC36
Operation functions	Standard Operation- Cooling Mode	✓	✓	✓
	Standard Operation- Power Cooling	✓	✓	✓
	Standard Operation- Heating Mode	✓	✓	✓
	Standard Operation- Dehumidification Mode	✓	✓	✓
	Standard Operation- Fan Mode	✓	✓	✓
	Standard Operation- Auto Operation Mode (2Set point Control)	✓	✓	✓
	Standard Operation- Auto Operation Mode (1Set point Control)	✓	✓	✓
	Standard Operation- Time Override	✓	✓	✓
	Standard Operation- Set back	✓	✓	✓
	Standard Operation- Hold	✓	✓	✓
	Standard Operation- Temperature Setting	✓	✓	✓
	Standard Operation- Airflow Setting	✓	✓	✓
	Sub Function- Energy-Saving Cooling Operation	✓	✓	✓
	Sub Function- Automatic Drying	✓	✓	✓
	Sub Function- Fan Auto	✓	✓	✓
	Function Setting- Vane Angle Control	✓	✓	✓
	Function Setting- Child Lock	✓	✓	✓
	Function Setting- Minimum Difference Between Heating and Cooling Set Points (2Set point Control)	✓	✓	✓
	Function Setting- Auto Change over Change temperature(1Set point Control)	✓	✓	✓
	Function Setting- Changing Current Time	✓	✓	✓
	Function Setting- Override set time	✓	✓	✓
	Function Setting- Set back temperature	✓	✓	✓
	Programming- Simple Reservation	✓	✓	✓
	Programming- Sleep Reservation	✓	✓	✓
	Programming- Weekly Reservation	✓	✓	✓
	Programming- Weekly Reservation Schedule Copy/Paste	✓	✓	✓
	Programming- Holiday Reservation	✓	✓	✓
	Programming- Delete All Reservation	✓	✓	✓
	Troubleshooting Mode Self Diagnosis	✓	✓	✓
	Checkups Before Reporting Breakdown	✓	✓	✓

Table 2-2 Thermostat functions available at the wall display (continued)

Category	Function	SRC18	SRC24	SRC36
Installation functions	Installer Setting- How to enter installer setting mode	✓	✓	✓
	Installer Setting- Test Run Mode	✓	✓	✓
	Installer Setting- Setting Address of Central Control	✓	✓	✓
	Installer Setting- Thermistor	✓	✓	✓
	Installer Setting- Dry Contact Mode Setting	✓	✓	✓
	Installer Setting- Fahrenheit / Celsius Switching	✓	✓	✓
	Installer Setting- Check indoor unit Address Number	✓	✓	✓
	Installer Setting- Set point range Lock	✓	✓	✓
	Installer Setting- Fan operation in the colling mode and thermal off conditions	✓	✓	✓
	Installer Setting- Hold Enable / Disable	✓	✓	✓
	Installer Setting- Indoor unit Auto Start setting	✓	✓	✓
	Installer Setting- Setting for Simple Dry contact unit	✓	✓	✓

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3.0 Performance Data

3.1 Cooling Capacity

Table 3-1 SRC18 Cooling Capacities

Outdoor Air Temp (°F DB)	Indoor Air Temp (°F DB / °F WB)																				
	64 / 53			68 / 57			72 / 61			77 / 64			80 / 67			86 / 72			90 / 75		
	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
0[4]	11.02	8.83	0.56	13.78	9.41	0.67	16.54	9.98	0.77	19.99	10.70	0.90	22.06	11.12	0.98	18.40	12.13	0.80	15.97	12.80	0.68
5[4]	10.81	8.71	0.59	13.51	9.27	0.70	16.22	9.84	0.81	19.60	10.54	0.94	21.63	10.97	1.02	18.05	11.96	0.83	15.66	12.62	0.71
7[4]	10.88	8.79	0.60	13.61	9.36	0.70	16.33	9.93	0.81	19.74	10.64	0.95	21.78	11.07	1.03	18.18	12.07	0.84	15.77	12.74	0.71
10[4]	10.99	8.91	0.61	13.75	9.49	0.72	16.50	10.06	0.83	19.94	10.79	0.97	22.01	11.22	1.05	18.36	12.23	0.86	15.93	12.91	0.73
14	11.14	8.97	0.91	11.98	9.64	0.63	12.81	10.31	0.65	13.64	10.98	0.67	14.03	11.29	0.69	15.31	12.33	0.72	16.15	13.00	0.74
23	11.96	9.63	0.61	12.86	10.35	0.63	13.75	11.07	0.65	14.65	11.79	0.67	15.06	12.12	0.69	16.44	13.23	0.72	17.34	13.96	0.74
25	12.13	9.77	0.62	13.03	10.49	0.64	13.92	11.21	0.66	14.82	11.93	0.68	15.23	12.26	0.70	16.61	13.37	0.73	17.51	14.09	0.75
30	12.60	10.15	0.67	13.52	10.88	0.69	14.44	11.62	0.71	15.32	12.33	0.73	15.74	12.67	0.76	17.13	13.79	0.79	18.09	14.56	0.81
35	13.08	10.53	0.72	14.02	11.28	0.74	14.95	12.04	0.76	15.81	12.73	0.78	16.25	13.08	0.81	17.65	14.21	0.84	18.67	15.03	0.86
40	13.55	10.91	0.76	14.51	11.68	0.79	15.47	12.45	0.81	16.31	13.13	0.83	16.77	13.50	0.86	18.17	14.63	0.89	19.25	15.50	0.92
45	14.02	11.29	0.81	15.00	12.08	0.83	15.99	12.87	0.86	16.81	13.53	0.89	17.28	13.91	0.91	18.69	15.05	0.95	19.84	15.97	0.98
50	14.49	11.67	0.85	15.50	12.47	0.88	16.50	13.28	0.91	17.30	13.93	0.94	17.79	14.32	0.96	19.21	15.47	1.00	20.42	16.44	1.03
55	14.96	12.05	0.90	15.99	12.87	0.93	17.02	13.70	0.96	17.80	14.33	0.99	18.30	14.73	1.02	19.73	15.88	1.06	21.00	16.91	1.09
60	15.44	12.43	0.95	16.48	13.27	0.98	17.53	14.11	1.01	18.30	14.73	1.04	18.81	15.15	1.07	20.25	16.30	1.11	21.58	17.38	1.14
65	15.91	12.81	0.99	16.98	13.67	1.02	18.05	14.53	1.05	18.79	15.13	1.09	19.33	15.56	1.12	20.77	16.72	1.17	22.17	17.81	1.20
70	16.38	13.19	1.04	17.47	14.06	1.07	18.56	14.94	1.10	19.29	15.53	1.14	19.84	15.97	1.17	21.29	17.14	1.22	22.75	18.3	1.26
75	16.17	13.02	1.07	17.27	13.90	1.10	18.36	14.78	1.14	19.11	15.38	1.17	19.66	15.82	1.21	21.02	16.92	1.25	22.57	18.17	1.29
80	15.75	12.68	1.11	16.84	13.56	1.15	17.93	14.44	1.18	18.75	15.09	1.22	19.47	15.68	1.26	20.75	16.70	1.31	22.20	17.87	1.35
85	15.33	12.34	1.19	16.42	13.22	1.23	17.51	14.09	1.27	18.38	14.90	1.31	19.11	15.38	1.35	20.48	16.48	1.40	21.87	17.61	1.44
90	14.91	12.00	1.24	16.00	12.88	1.28	17.08	13.75	1.32	18.02	14.50	1.36	18.75	15.09	1.40	20.20	16.26	1.46	21.44	17.26	1.50
95	14.46	11.64	1.28	15.54	12.51	1.32	16.62	13.38	1.36	17.70	14.25	1.40	18.20	14.65	1.45	19.87	15.99	1.50	20.95	16.87	1.55
100	14.08	11.33	1.30	15.16	12.20	1.37	16.24	13.08	1.38	17.32	13.95	1.43	17.96	14.46	1.47	19.49	15.69	1.53	20.57	16.56	1.58
105	13.70	11.03	1.32	14.78	11.90	1.36	15.86	12.77	1.41	16.95	13.64	1.45	17.73	14.27	1.50	19.11	15.38	1.56	20.19	16.26	1.60
110	13.32	10.72	1.34	14.40	11.59	1.38	15.49	12.47	1.42	16.57	13.34	1.47	17.35	13.97	1.51	18.73	15.08	1.57	19.82	15.95	1.62
115	12.94	10.42	1.35	14.02	11.29	1.39	15.11	12.16	1.44	16.19	13.03	1.48	16.97	13.66	1.53	18.35	14.78	1.59	19.44	15.65	1.64
118	12.56	10.11	1.36	13.65	10.99	1.41	14.56	11.72	1.45	15.65	12.60	1.49	16.38	13.19	1.54	17.75	14.28	1.60	18.75	15.09	1.65
122	11.96	9.63	1.37	12.99	10.45	1.41	14.01	11.28	1.46	15.04	12.10	1.50	15.78	12.70	1.55	17.09	13.75	1.61	18.11	14.58	1.66

DB = Dry Bulb Temperature (°F), WB = Wet Bulb Temperature (°F), TC = Total Capacity (kBtuh), SHC = Sensible Capacity (kBtuh)
PI = Power Input (kW) (includes compressor, indoor fan motor, and outdoor fan motor)
1. All capacities are net, evaporator fan motor is heat deducted.
2. Grey shading indicates reference data. When operating the unit at this temperature, these values can be different by discontinuous operation.
3. Direct interpolation is permissible. Do not extrapolate.
4. Capacities at less than 14° require a wind baffle.
Nominal capacity as rated: 0 ft above seal level with 25 ft of refrigerant piping. 0 ft. level difference between outdoor and indoor units.
Nominal cooling capacity rating obtained with air entering the indoor unit at 80°F DB and 67°F WB, and outdoor ambient conditions of 95°F DB and 75°F WB.

Table 3-2 SRC24 Cooling Capacities

Outdoor Air Temp (°F DB)	Indoor Air Temp (°F DB / °F WB)																				
	64 / 53			68 / 57			72 / 61			77 / 64			80 / 67			86 / 72			90 / 75		
	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
0[4]	13.32	11.54	0.68	16.66	12.29	0.81	19.99	13.04	0.93	24.16	13.97	1.09	26.66	14.53	1.19	22.25	15.85	0.97	19.30	16.73	0.82
5[4]	13.07	11.38	0.72	16.34	12.11	0.85	19.61	12.85	0.98	23.70	13.77	1.14	26.15	14.33	1.24	21.82	15.62	1.01	18.93	16.49	0.86
7[4]	13.16	11.48	0.72	16.45	12.23	0.86	19.74	12.97	0.99	23.86	13.90	1.15	26.33	14.46	1.25	21.97	15.77	1.02	19.06	16.64	0.87
10[4]	13.29	11.64	0.73	16.62	12.39	0.87	19.95	13.15	1.00	24.10	14.09	1.17	26.60	14.66	1.27	22.20	15.98	1.04	19.26	16.87	0.88
14	12.81	9.92	0.75	14.04	10.87	0.77	14.83	11.48	0.79	15.83	12.26	0.82	16.74	12.96	0.84	17.41	13.48	0.88	18.86	14.60	0.90
17	12.92	10.00	0.75	14.39	11.14	0.77	15.21	11.77	0.79	16.24	12.57	0.82	17.37	13.45	0.84	18.08	14.00	0.88	19.34	14.97	0.90
23	14.31	11.08	0.74	15.38	11.91	0.77	16.45	12.74	0.79	17.52	13.57	0.81	18.85	14.59	0.84	19.66	15.22	0.87	20.73	1605	0.90
59	17.35	13.43	0.86	18.65	14.44	0.88	19.95	15.45	0.91	21.25	16.45	0.94	21.84	16.91	0.97	23.85	18.46	1.01	25.14	19.47	1.04
70	19.80	15.33	1.26	21.12	16.35	1.30	22.44	17.38	1.34	23.32	18.06	1.38	23.98	18.57	1.43	25.74	19.93	1.48	27.50	21.29	1.53
75	19.55	15.13	1.30	20.87	16.16	1.34	22.20	17.19	1.38	23.10	17.89	1.42	23.76	18.40	1.47	25.41	19.67	1.53	27.28	21.12	1.57
80	19.03	14.74	1.36	20.36	15.76	1.40	21.68	16.79	1.44	22.66	17.55	1.49	23.54	18.23	1.53	25.08	19.42	1.59	26.84	20.78	1.64
85	18.53	14.35	1.45	19.85	15.37	1.49	21.16	16.39	1.54	22.22	17.20	1.59	23.10	17.89	1.64	24.75	19.16	1.70	26.44	20.47	1.75
90	18.02	13.95	1.51	19.34	14.97	1.56	20.65	15.99	1.61	21.78	16.86	1.66	22.66	17.55	1.71	24.42	18.91	1.78	25.91	20.06	1.83
95	17.47	13.53	1.56	18.78	14.54	1.61	20.09	15.56	1.66	21.40	16.57	1.71	22.00	17.03	.76	24.02	18.60	1.83	25.33	19.61	1.89
100	17.02	13.18	1.58	18.33	14.19	1.63	19.63	15.20	1.68	20.94	16.22	1.74	21.71	16.81	1.79	23.56	18.24	1.86	24.87	19.26	1.92
105	16.56	12.82	1.61	17.87	13.84	1.66	19.18	14.85	1.71	20.48	15.86	1.76	21.43	16.59	1.82	23.10	17.89	1.89	24.41	18.90	1.95
110	16.10	12.47	1.63	17.41	13.48	1.68	18.72	14.49	1.73	20.03	15.51	1.78	20.97	16.24	1.84	22.64	17.53	1.91	23.95	18.55	1.97
115	15.64	12.11	1.64	16.95	13.13	1.69	18.26	14.14	1.75	19.57	15.15	1.80	20.50	15.88	1.86	22.19	17.18	1.93	23.50	18.19	1.99
118	15.18	11.75	1.66	16.50	12.78	1.71	17.60	13.63	1.75	18.92	14.65	1.82	19.80	15.33	1.87	21.45	16.61	1.95	22.66	17.55	2.01

DB = Dry Bulb Temperature (°F), WB = Wet Bulb Temperature (°F), TC = Total Capacity (kBtuh), SHC = Sensible Capacity (kBtuh)
PI = Power Input (kW) (includes compressor, indoor fan motor, and outdoor fan motor)
1. All capacities are net, evaporator fan motor is heat deducted.
2. Grey shading indicates reference data. When operating the unit at this temperature, these values can be different by discontinuous operation.
3. Direct interpolation is permissible. Do not extrapolate.
4. Capacities at less than 14° require a wind baffle.

Nominal capacity as rated: 0 ft above seal level with 25 ft of refrigerant piping. 0 ft. level difference between outdoor and indoor units.
Nominal cooling capacity rating obtained with air entering the indoor unit at 80°F DB and 67°F WB, and outdoor ambient conditions of 95°F DB and 75°F WB.

Table 3-3 SRC36 Cooling Capacities

Outdoor Air Temp (°F DB)	Indoor Air Temp (°F DB / °F WB)																				
	64 / 53			68 / 57			72 / 61			77 / 64			80 / 67			86 / 72			90 / 75		
	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
0[4]	19.98	14.13	1.57	24.98	15.04	1.86	29.99	15.96	2.14	36.24	17.10	2.50	39.99	17.79	2.72	33.37	19.40	2.22	28.95	20.48	1.88
5[4]	19.60	13.93	1.64	24.50	14.83	1.94	29.41	15.73	2.24	35.54	16.86	2.62	39.23	17.54	2.85	32.73	19.13	2.32	28.40	20.18	1.97
7[4]	19.73	14.06	1.66	24.67	14.97	1.96	29.61	15.88	2.27	35.79	17.02	2.65	39.50	17.70	2.88	32.96	19.30	2.35	28.60	20.37	1.99
10[4]	19.94	14.25	1.69	24.93	15.17	2.00	29.92	16.09	2.30	36.16	17.25	2.69	39.90	17.94	2.92	33.29	19.57	2.38	28.89	20.65	2.02
14	19.21	14.88	1.71	21.05	16.30	1.77	22.24	17.22	1.82	23.75	18.39	1.88	25.10	19.44	1.94	26.12	20.22	2.01	28.29	21.90	2.07
17	19.38	15.00	1.72	21.59	16.72	1.77	22.81	17.66	1.82	24.36	18.86	1.88	26.06	20.17	1.94	27.13	21.00	2.02	29.01	22.46	2.08
23	21.46	16.62	1.71	23.07	17.86	1.76	24.67	19.10	1.81	26.28	20.35	1.87	28.27	21.89	1.93	29.49	22.84	2.01	31.10	24.08	2.07
59	26.02	20.15	1.97	27.97	21.66	2.03	29.92	23.17	2.09	31.87	24.68	2.16	32.76	2.37	2.22	35.77	27.70	2.31	37.72	29.20	2.38
70	29.70	23.00	2.90	31.68	24.53	2.99	33.66	26.06	3.08	34.98	27.09	3.18	35.97	27.85	3.27	38.61	29.90	3.41	41.25	31.94	3.51
75	23.92	22.70	2.98	31.31	24.24	3.07	33.29	25.78	3.17	34.65	26.83	3.27	35.64	27.60	3.37	38.12	29.51	3.50	40.92	31.68	3.61
80	28.55	22.11	3.11	30.53	23.64	3.21	32.52	25.18	3.31	33.99	26.32	3.41	35.31	27.34	3.51	37.62	29.13	3.66	40.26	31.17	3.77
85	27.79	21.52	3.33	29.77	23.05	3.43	31.75	24.58	3.54	33.33	25.81	3.64	34.65	26.83	3.76	37.13	28.75	3.91	39.66	30.71	4.02
90	27.03	20.93	3.47	29.00	22.46	3.58	30.98	23.99	3.69	32.67	25.30	3.80	33.99	26.32	3.92	36.63	28.36	4.08	38.87	30.09	4.20
95	26.21	20.30	3.58	28.17	21.82	3.69	30.14	23.33	3.80	32.10	24.85	3.92	33.00	25.55	4.04	36.03	27.89	4.20	37.99	29.41	4.33
100	25.53	19.76	3.64	27.49	21.28	3.75	29.45	22.80	3.86	31.41	24.32	3.98	32.57	25.22	4.11	35.34	27.36	4.27	37.30	28.88	4.40
105	24.84	19.23	3.70	26.80	20.75	3.81	28.76	22.27	3.93	30.73	23.79	4.05	32.14	24.89	4.18	34.65	26.83	4.34	36.62	28.35	4.47
110	24.15	18.70	3.74	26.12	20.22	3.85	28.08	21.74	3.97	30.04	23.26	4.10	31.46	24.36	4.22	33.97	26.30	4.39	35.93	27.82	4.52
115	23.47	18.17	3.77	25.43	19.69	3.89	27.39	21.21	4.01	29.36	22.73	4.13	30.77	23.83	4.26	33.28	25.77	4.43	35.24	27.29	4.57
118	22.77	17.63	3.81	24.75	19.16	3.93	26.40	20.44	4.05	28.38	21.97	4.17	29.70	23.00	4.30	32.18	24.91	4.47	33.99	26.32	4.61

DB = Dry Bulb Temperature (°F), WB = Wet Bulb Temperature (°F), TC = Total Capacity (kBtuh), SHC = Sensible Capacity (kBtuh)
PI = Power Input (kW) (includes compressor, indoor fan motor, and outdoor fan motor)
1. All capacities are net, evaporator fan motor is heat deducted.
2. Grey shading indicates reference data. When operating the unit at this temperature, these values can be different by discontinuous operation.
3. Direct interpolation is permissible. Do not extrapolate.
4. Capacities at less than 14° require a wind baffle.

Nominal capacity as rated: 0 ft above seal level with 25 ft of refrigerant piping. 0 ft. level difference between outdoor and indoor units.
Nominal cooling capacity rating obtained with air entering the indoor unit at 80°F DB and 67°F WB, and outdoor ambient conditions of 95°F DB and 75°F WB.

3.2 Heating Capacity

Table 3-4 SRC18 Heating Capacities

Outdoor Air Temp (°F DB)		Indoor Air Temp (°F DB / °F WB)													
		60		64		68		70		72		75		86	
°F DB	°F WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
–3	–4	11.22	1.17	10.88	1.16	10.77	1.16	10.37	1.15	10.58	1.15	10.37	1.14	10.12	1.14
0	–1	12.22	1.29	11.85	1.28	11.73	1.28	11.61	1.26	11.52	1.26	11.29	1.25	11.02	1.25
6	5	12.93	1.35	12.53	1.33	12.41	1.33	12.29	1.32	12.19	1.32	11.95	1.31	11.66	1.31
10	9	13.50	1.39	13.09	1.38	12.95	1.38	12.83	1.36	12.73	1.36	12.47	1.35	12.17	1.35
16	14	13.92	1.40	13.50	1.39	13.36	1.39	13.23	1.38	13.13	1.38	12.87	1.36	12.56	1.36
19	17	14.21	1.45	13.77	1.43	13.64	1.43	13.50	1.42	13.40	1.42	13.13	1.41	12.82	1.41
24	23	15.58	1.50	15.11	1.49	14.96	1.49	14.81	1.47	14.69	1.47	14.40	1.46	14.06	1.46
32	30	18.68	.62	18.11	1.61	17.93	1.61	17.75	1.59	17.61	1.59	17.26	1.57	16.85	1.57
41	38	21.43	1.73	20.78	1.71	20.57	1.71	20.37	1.69	20.21	1.69	19.80	1.68	19.33	1.68
43	40	21.12	1.76	21.45	1.74	21.23	1.74	21.02	1.72	20.86	1.72	20.44	1.70	19.95	1.70
47	43	23.15	1.80	22.45	1.78	22.22	1.78	22.00	1.76	21.83	1.76	21.39*	1.74	20.88	1.74
53	50	23.38	1.81	22.67	1.80	22.44	1.80	22.22	1.78	22.05	1.78	21.61	1.76	21.09	1.76
59	53	23.91	1.83	23.19	1.81	22.95	1.81	22.73	1.80	22.55	1.80	22.10	1.78	21.57	1.78
64	57	24.42	1.87	23.68	1.85	23.44	1.85	23.21	1.83	23.03	1.83	22.57	1.81	22.03	1.81
70	61	24.89	1.89	24.13	1.88	23.89	1.88	23.65	1.86	23.47	1.86	23.00	1.84	22.45	1.84
75	65	25.23	1.92	24.47	1.90	24.22	1.90	23.98	1.88	23.80	1.88	23.32	1.86	22.76	1.86

DB = Dry Bulb Temperature (°F), WB = Wet Bulb Temperature (°F), TC = Total Capacity (kBtuh),
PI = Power Input (kW) (includes compressor, indoor fan motor, and outdoor fan motor)
1. All capacities are net, evaporator fan motor is heat deducted.
2. Direct interpolation is permissible. Do not extrapolate.
Nominal capacity as rated: 0 ft above seal level with 25 ft of refrigerant piping. 0 ft. level difference between outdoor and indoor units.
Nominal heating capacity rating obtained with air entering the indoor unit at 70°F DB and 60°F WB, and outdoor ambient conditions of 47°F DB and 43°F WB.

Table 3-5 SRC24 Heating Capacities

Outdoor Air Temp (°F DB)		Indoor Air Temp (°F DB / °F WB)													
		60		64		68		70		72		75		86	
°F DB	°F WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
–3	–4	16.29	1.59	15.86	1.57	15.72	1.57	15.59	1.56	15.49	1.56	15.22	1.54	14.91	1.54
–0.4	–1	17.53	1.74	17.07	1.73	16.92	1.73	16.77	1.71	16.66	1.71	16.37	1.69	16.04	1.69
6	5	18.43	1.82	17.93	1.80	17.77	1.80	17.62	1.79	17.50	1.79	17.20	1.77	16.84	1.77
10	9	19.14	1.88	18.62	1.86	18.46	1.86	18.30	1.84	18.17	1.84	17.85	1.82	17.48	1.82
16	14	19.67	1.90	19.14	1.88	18.97	1.88	18.81	1.86	18.68	1.86	18.35	1.84	17.96	1.84
19	17	20.03	1.96	19.49	1.84	19.31	1.94	19.06	1.92	19.01	1.92	18.68	1.90	18.29	1.90
24	23	21.74	2.03	21.20	2.01	21.02	2.01	20.77	1.99	20.72	1.99	20.39	1.97	19.99	1.97
32	30	23.763	2.19	23.19	2.17	23.01	2.17	22.76	2.15	22.72	2.15	22.38	2.13	21.99	2.13
41	38	26.01	2.34	25.47	2.31	25.29	2.31	25.04	2.29	24.99	2.29	24.66	2.27	24.26	2.27
43	40	26.58	2.37	26.04	2.35	25.86	2.36	25.61	2.33	25.56	2.33	25.22	2.30	24.83	2.30
47	43	29.04	2.43	28.16	2.40	27.88	2.40	27.00	2.38	27.39	2.38	26.84	2.36	26.20	2.36
53	50	29.33	2.45	28.44	2.43	28.15	2.43	27.88	2.40	27.66	2.40	27.11	2.38	26.46	2.38
59	55	30.00	2.48	29.09	.245	28.80	2.45	28.51	2.43	28.29	2.43	27.72	2.40	27.07	2.40
64	60	30.64	2.52	29.71	2.50	29.41	2.50	29.12	2.48	28.90	2.48	28.32	2.45	27.64	2.45
70	66	31.22	2.56	30.27	2.54	29.97	2.54	29.67	2.51	29.44	2.51	28.85	2.49	28.17	2.49
75	71	31.66	2.60	30.70	2.57	30.38	2.57	30.08	2.55	29.85	2.55	29.25	2.52	28.56	2.52
78	75	31.95	2.62	30.98	2.60	30.66	2.60	30.36	2.57	30.13	2.57	29.52	2.54	28.82	2.54

DB = Dry Bulb Temperature (°F), WB = Wet Bulb Temperature (°F), TC = Total Capacity (kBtuh),
PI = Power Input (kW) (includes compressor, indoor fan motor, and outdoor fan motor)
1. All capacities are net, evaporator fan motor is heat deducted.
2. Direct interpolation is permissible. Do not extrapolate.
Nominal capacity as rated: 0 ft above seal level with 25 ft of refrigerant piping. 0 ft. level difference between outdoor and indoor units.
Nominal heating capacity rating obtained with air entering the indoor unit at 70°F DB and 60°F WB, and outdoor ambient conditions of 47°F DB and 43°F WB.

Table 3-6 SRC36 Heating Capacities

Outdoor Air Temp (°F DB)		Indoor Air Temp (°F DB / °F WB)													
		60		64		68		70		72		75		86	
°F DB	°F WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
–3	–4	20.77	2.56	20.23	2.53	20.05	2.53	19.88	2.51	19.75	2.51	19.41	2.48	19.02	2.48
–0.4	–1	22.36	2.81	21.77	2.78	21.58	2.78	21.39	2.76	21.25	2.76	20.88	2.73	20.45	2.73
6	5	23.50	2.94	22.87	2.91	22.67	2.91	22.47	2.88	22.32	2.88	21.93	2.85	21.48	2.85
10	9	24.41	3.03	23.75	3.00	23.54	3.00	23.34	2.97	23.18	2.97	22.77	2.94	22.30	2.94
16	14	25.09	3.07	24.41	3.04	24.20	3.04	23.98	3.01	23.82	3.01	23.40	2.98	22.91	2.98
19	17	25.55	3.16	24.86	3.13	24.63	3.13	24.31	3.10	24.25	3.10	23.82	3.07	23.32	3.07
24	23	27.72	3.28	27.03	3.24	26.81	3.24	26.49	3.21	26.43	3.21	26.00	3.18	25.50	3.18
32	30	30.26	3.54	29.57	3.50	29.35	3.50	29.03	3.47	28.97	3.47	28.54	3.43	28.04	3.43
41	38	33.17	3.77	32.48	3.73	32.26	3.73	31.93	3.70	31.87	3.70	31.44	3.66	30.94	3.66
43	40	33.89	3.83	33.21	3.79	32.98	3.79	32.66	3.75	32.60	3.75	32.17	3.72	31.67	3.72
47	43	37.04	3.92	35.92	3.88	35.55	3.88	35.20	3.894	34.93	3.84	34.23	3.81	33.42	3.80
53	50	37.41	3.96	36.28	3.92	35.91	3.92	35.55	3.88	35.28	3.88	34.57	3.84	33.75	3.84
59	55	38.26	4.00	37.10	3.96	36.73	3.96	36.36	3.92	36.08	3.92	35.36	3.88	34.52	3.88
64	60	39.08	4.07	37.89	4.03	37.51	4.03	37.14	3.99	36.85	3.99	36.11	3.95	35.25	3.95
70	66	39.82	4.13	38.61	4.09	38.22	4.09	37.84	4.05	37.55	4.05	36.80	4.01	35.92	4.01
75	71	40.37	4.19	39.15	4.15	38.75	4.15	38.37	4.11	38.07	4.11	37.31	4.07	36.42	4.07
78	75	40.74	4.23	39.51	4.19	39.11	4.19	38.72	4.15	38.42	4.15	37.65	4.11	36.76	4.11

DB = Dry Bulb Temperature (°F), WB = Wet Bulb Temperature (°F), TC = Total Capacity (kBtuh),
PI = Power Input (kW) (includes compressor, indoor fan motor, and outdoor fan motor)
1. All capacities are net, evaporator fan motor is heat deducted.
2. Direct interpolation is permissible. Do not extrapolate.
Nominal capacity as rated: 0 ft above seal level with 25 ft of refrigerant piping. 0 ft. level difference between outdoor and indoor units.
Nominal heating capacity rating obtained with air entering the indoor unit at 70°F DB and 60°F WB, and outdoor ambient conditions of 47°F DB and 43°F WB.

3.3 Cooling/Heating Correction Factors

For Liebert SRC systems, calculate the equivalent length of the liquid line from the outdoor unit to the indoor unit. Also, determine the elevation difference of the indoor unit above or below the outdoor unit. Find corresponding cooling or heating capacity correction factors as shown in **Figures 3-1** through **3-4**. Multiply the correction factors by the cooling or heating capacity obtained from the capacity tables in **3.0 - Performance Data**, using design conditions. The resultant is the NET cooling or heating capacity.

Figure 3-1 SRC18 Cooling coefficient factor

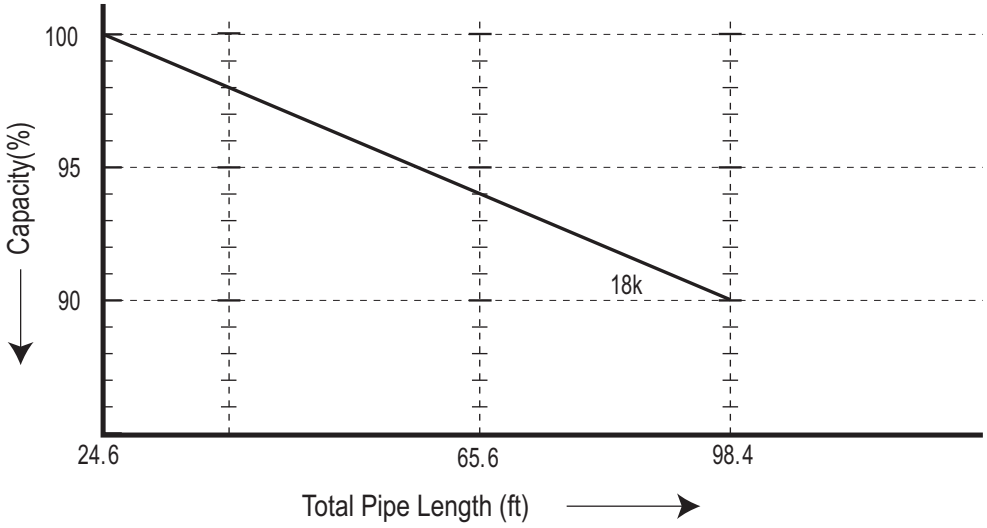


Figure 3-2 SRC18 Heating coefficient factor

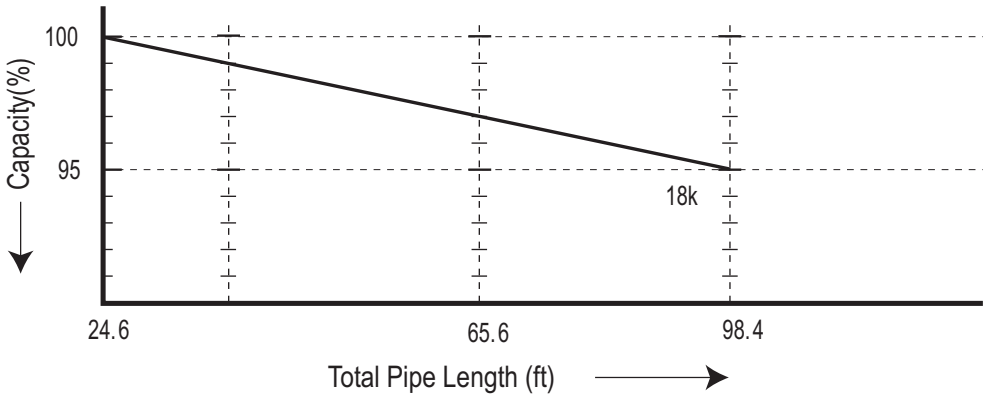


Figure 3-3 SRC24 and SRC36 Cooling coefficient factor

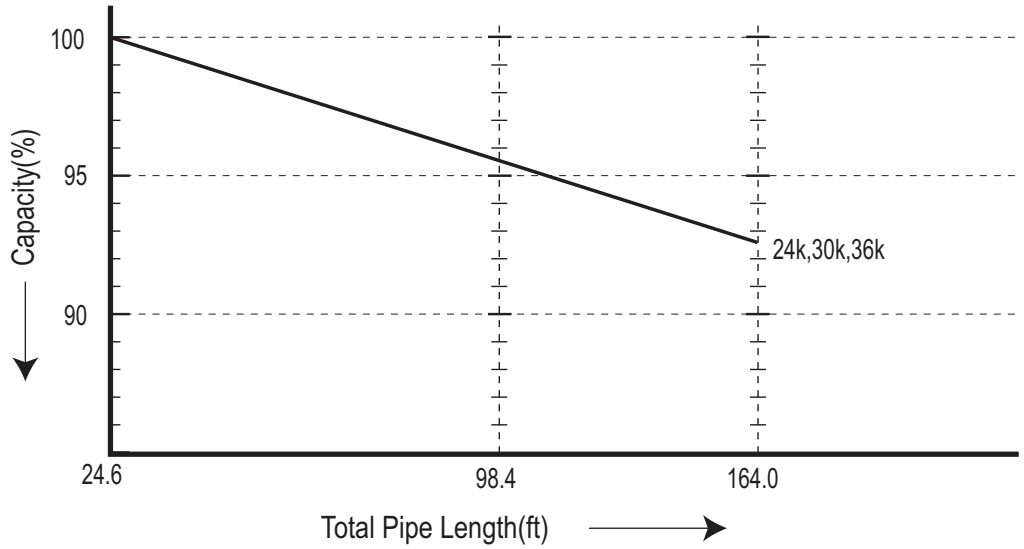
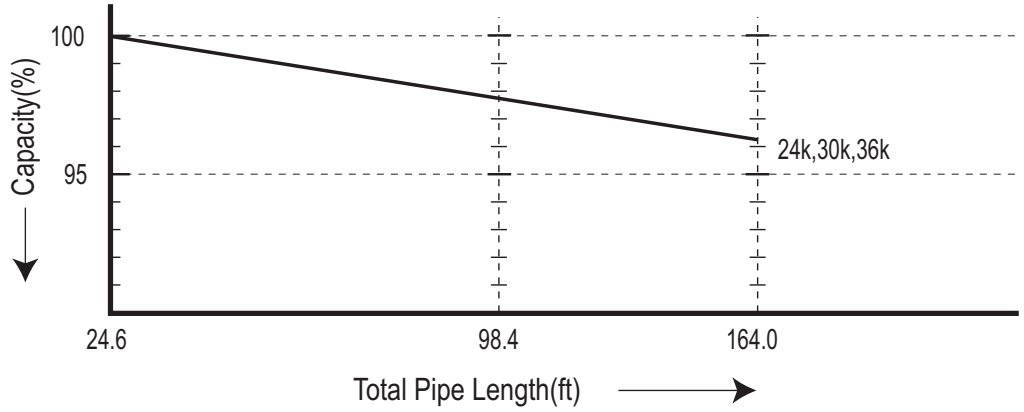


Figure 3-4 SRC24 and SRC36 Heating coefficient factor



3.4 Acoustic Data

- Measurements are taken 3.28 ft away from the front of the unit, **Figures 3-5** and **3-6**.
- Sound-pressure levels are measured in dB(A) with a tolerance of ±3.
- Sound-pressure levels are tested in an anechoic chamber under ISO Standard 3745.
- Sound level will vary depending on a range of factors including the construction (acoustic absorption coefficient) of a particular room in which the unit was installed.

Table 3-7 Indoor-unit acoustic data

Model	Sound-pressure levels (dB[A])					
	Cooling (max)			Heating (max)		
	H	M	L	H	M	L
SRC18	47	42	37	47	42	37
SRC24	51	46	42	51	46	42
SRC36	51	46	42	51	46	42

Table 3-8 Outdoor-unit acoustic data

Model	Sound-pressure levels (dB[A])	
	Cooling	Heating
SRC18	55	55
SRC24	57	57
SRC36	57	57

Figure 3-5 Indoor unit sound-pressure measurement set-up

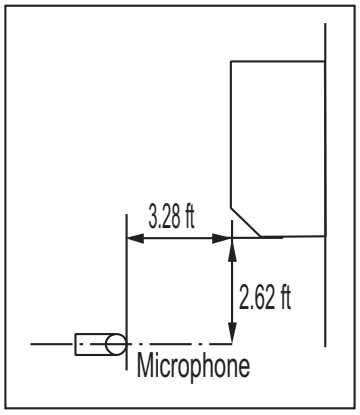


Figure 3-6 Outdoor unit sound-pressure measurement set-up

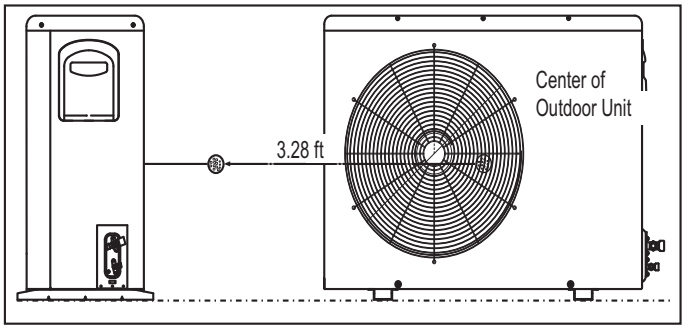


Figure 3-7 Sound-pressure levels for SRC18 indoor unit

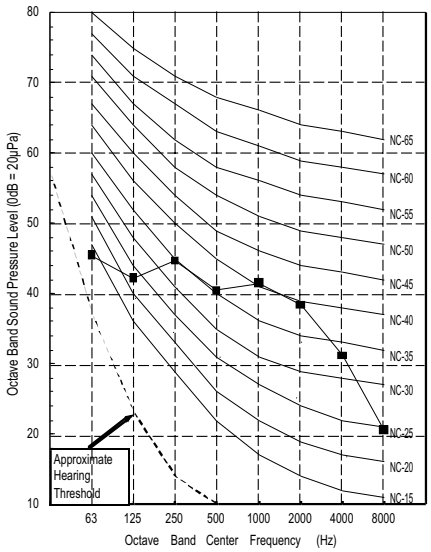


Figure 3-8 Sound-pressure levels for SRC18 outdoor unit

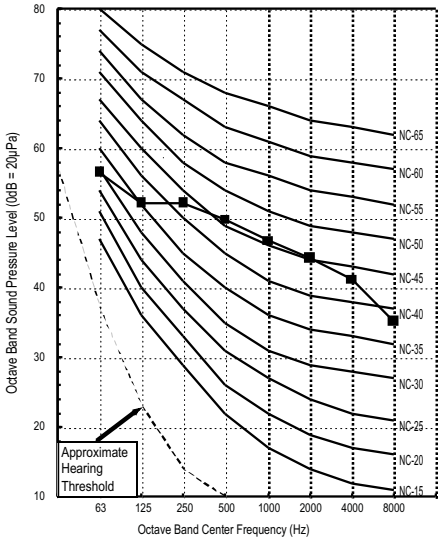


Figure 3-9 Sound-pressure levels for SRC24 indoor unit

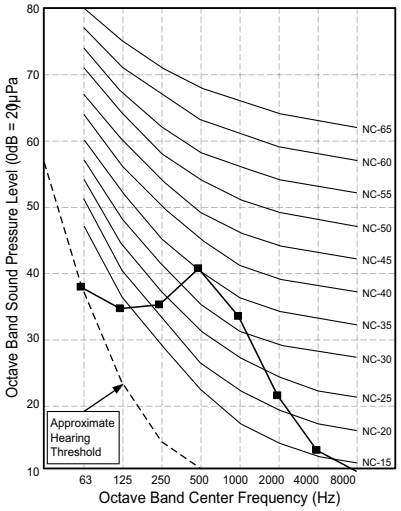


Figure 3-10 Sound-pressure levels for SRC36 indoor unit

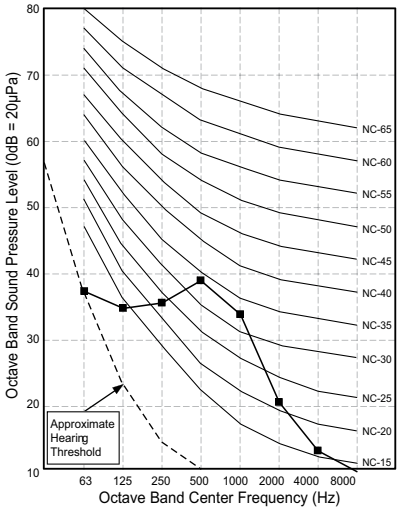
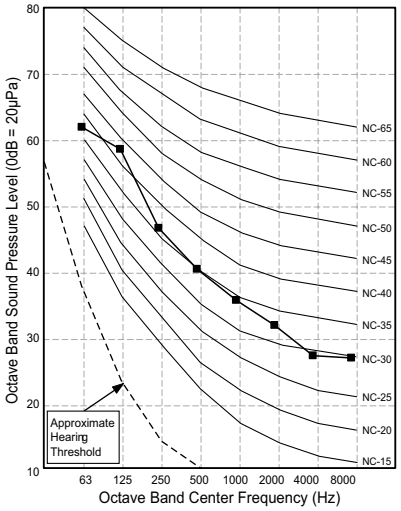


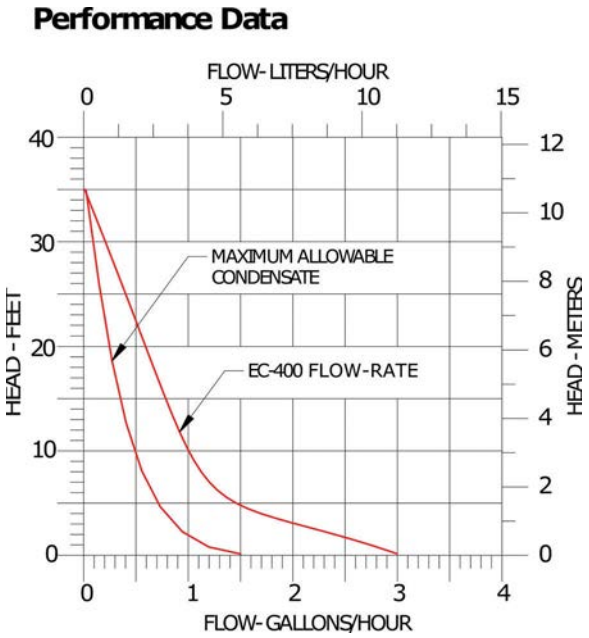
Figure 3-11 Sound-pressure levels for SRC24 and SRC36 outdoor unit



3.5 Condensate Pump Performance

The condensate pump has a capacity of 1 GPH (3.8 LPH) at 10 ft (3 m) head.

Figure 3-12 Condensate pump performance data



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4.0 Dimensional Data

4.1 SRC18 Unit Dimensions

Figure 4-1 Dimensional data, SRC18 indoor unit

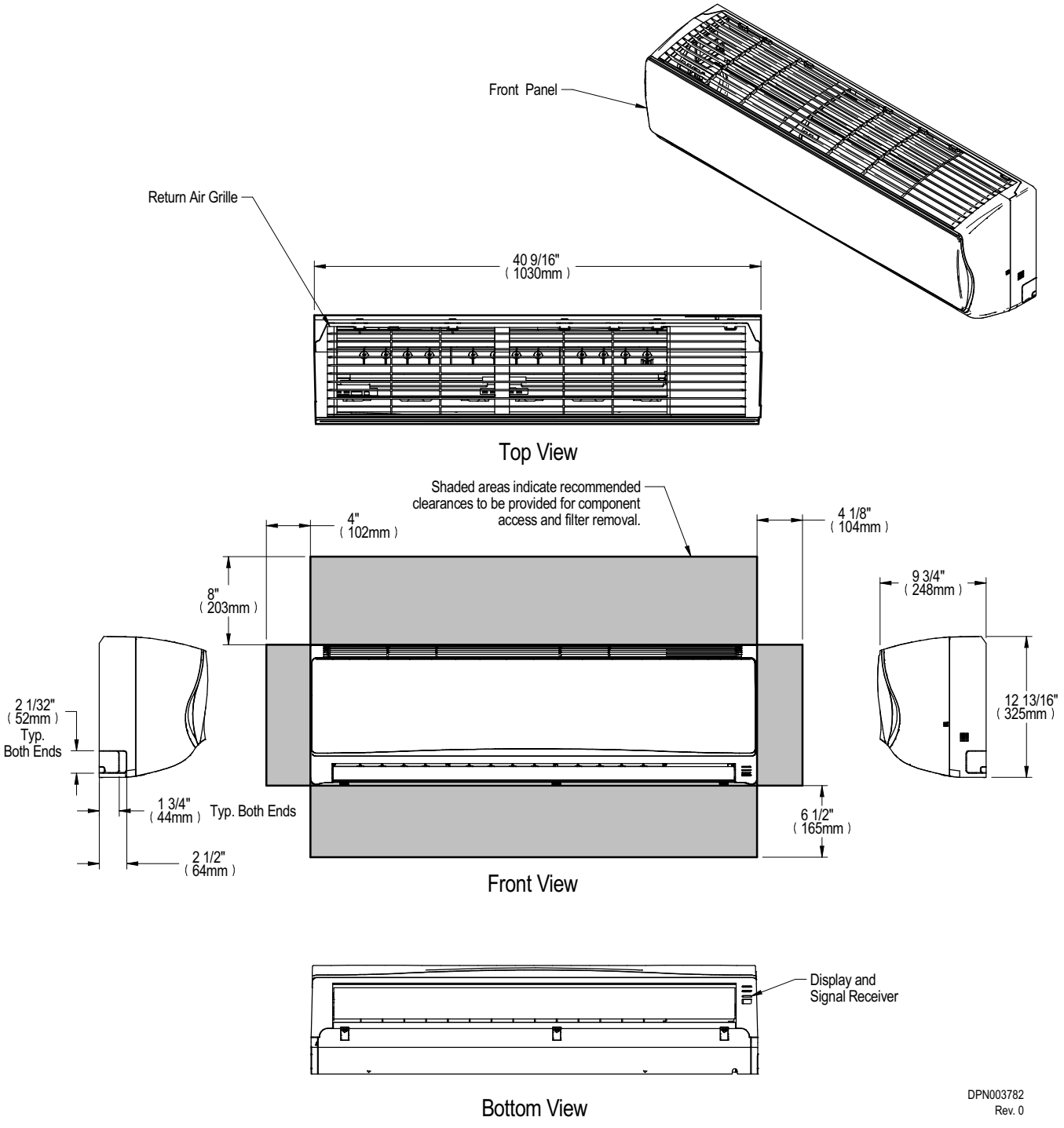
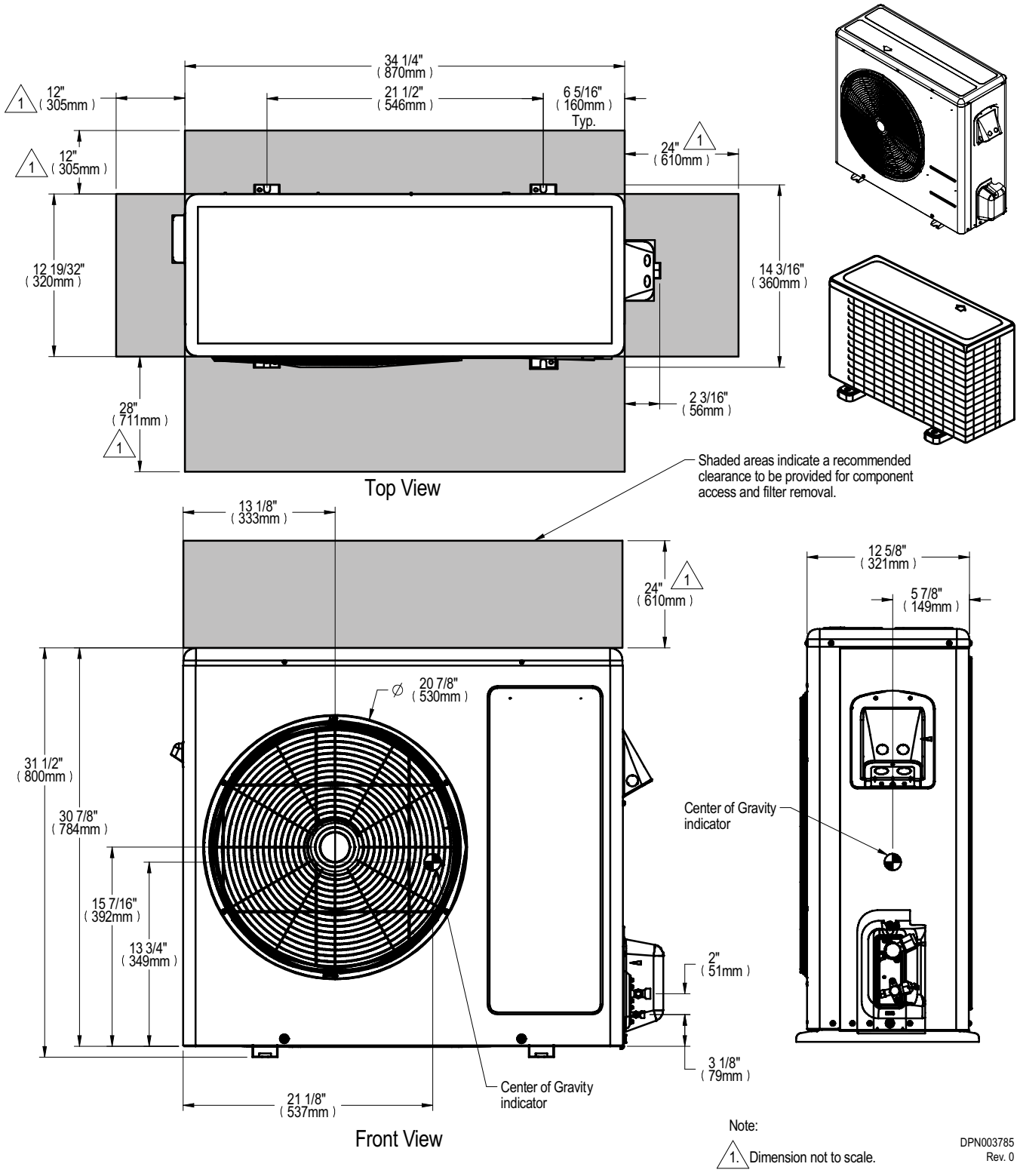


Figure 4-2 Dimensional data, SRC18 outdoor unit



4.2 SRC24 Unit Dimensions

Figure 4-3 Dimensional data, SRC24 indoor unit

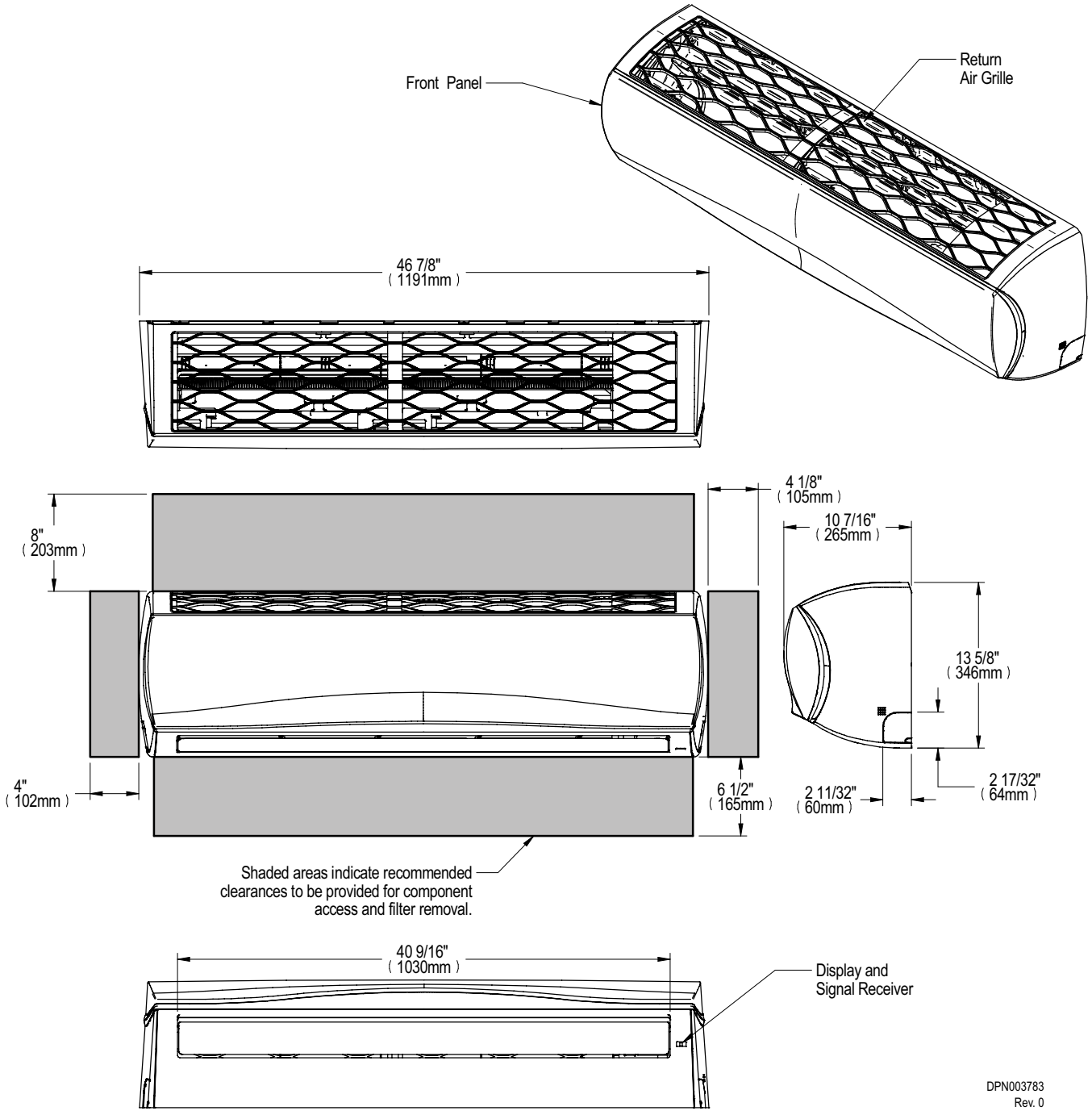
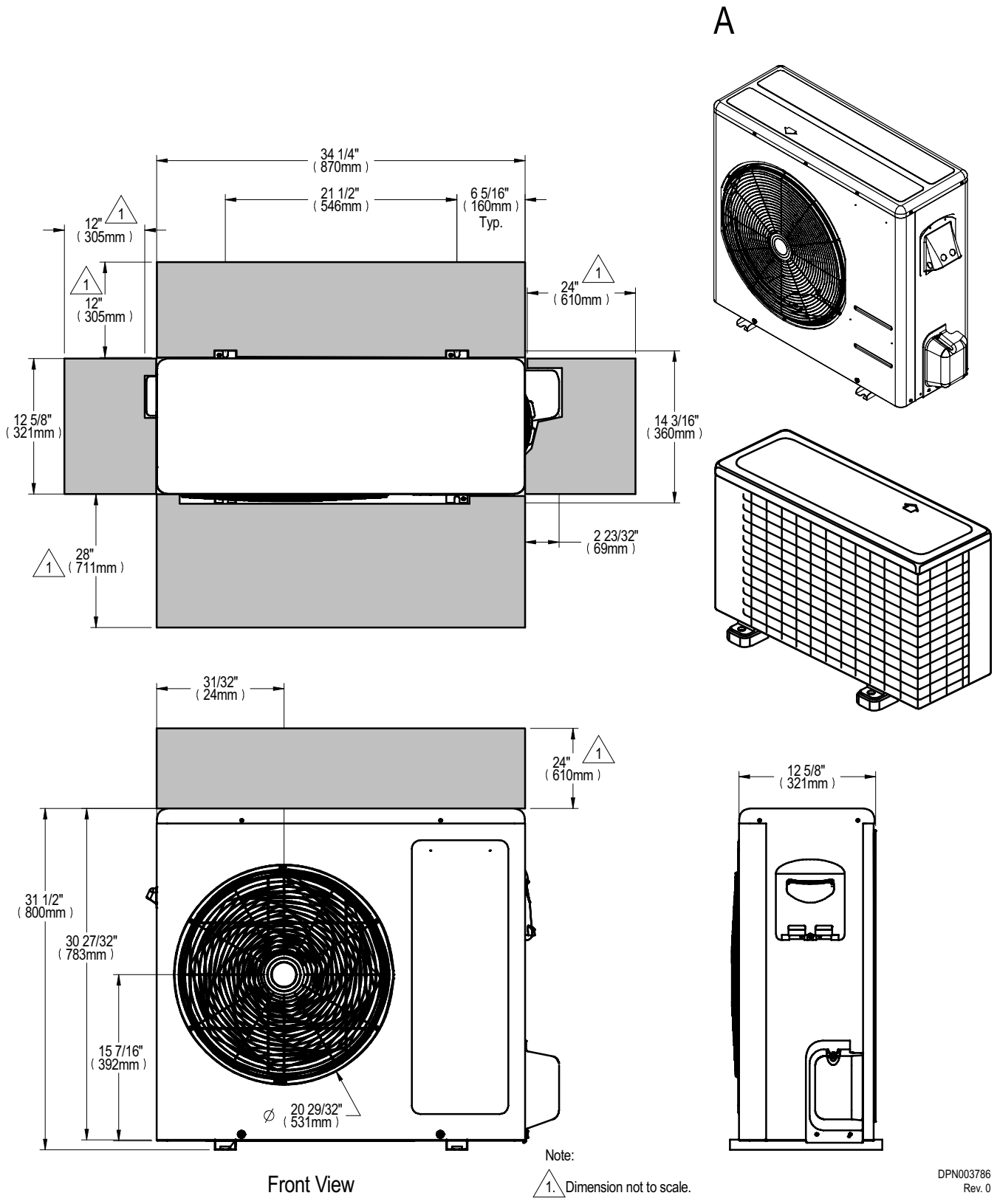


Figure 4-4 Dimensional data, SRC24 outdoor unit



4.3 SRC36 Unit Dimensions

Figure 4-5 Dimensional data, SRC36 indoor unit

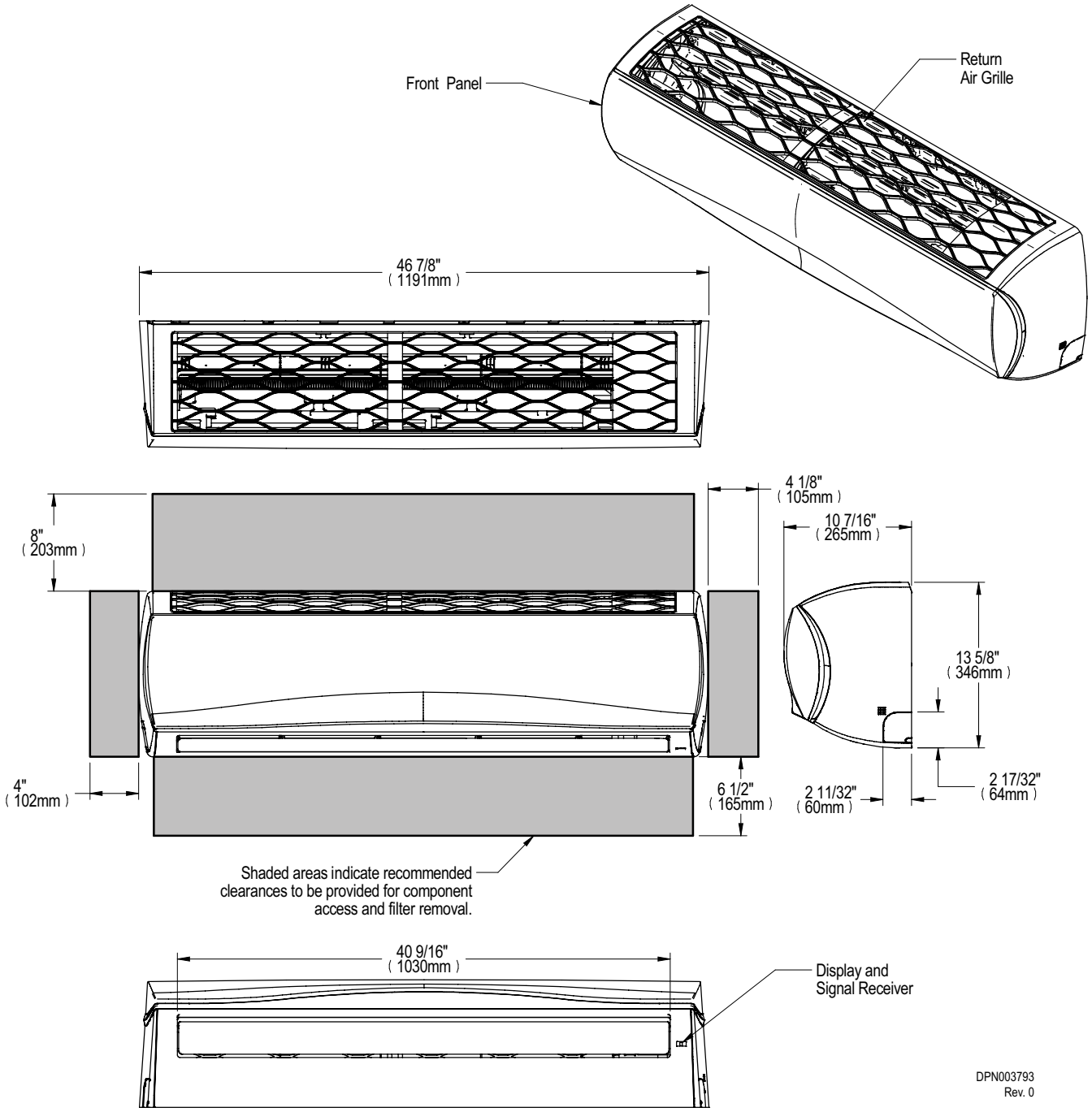
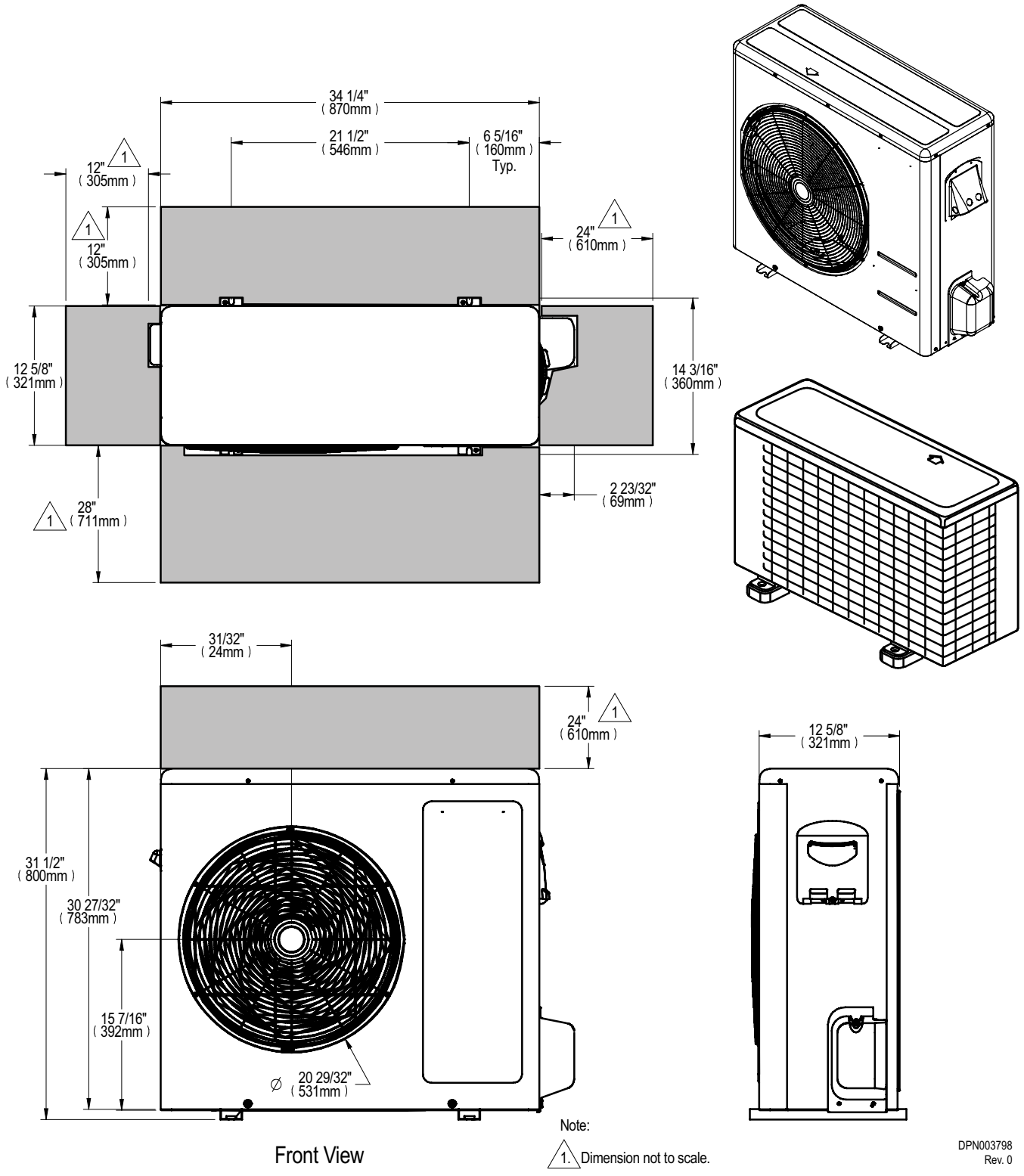


Figure 4-6 Dimensional data, SRC36 outdoor unit



4.4 Low Ambient Wind Baffle Dimensions

Figure 4-7 Wind baffle, SRC18 outdoor unit

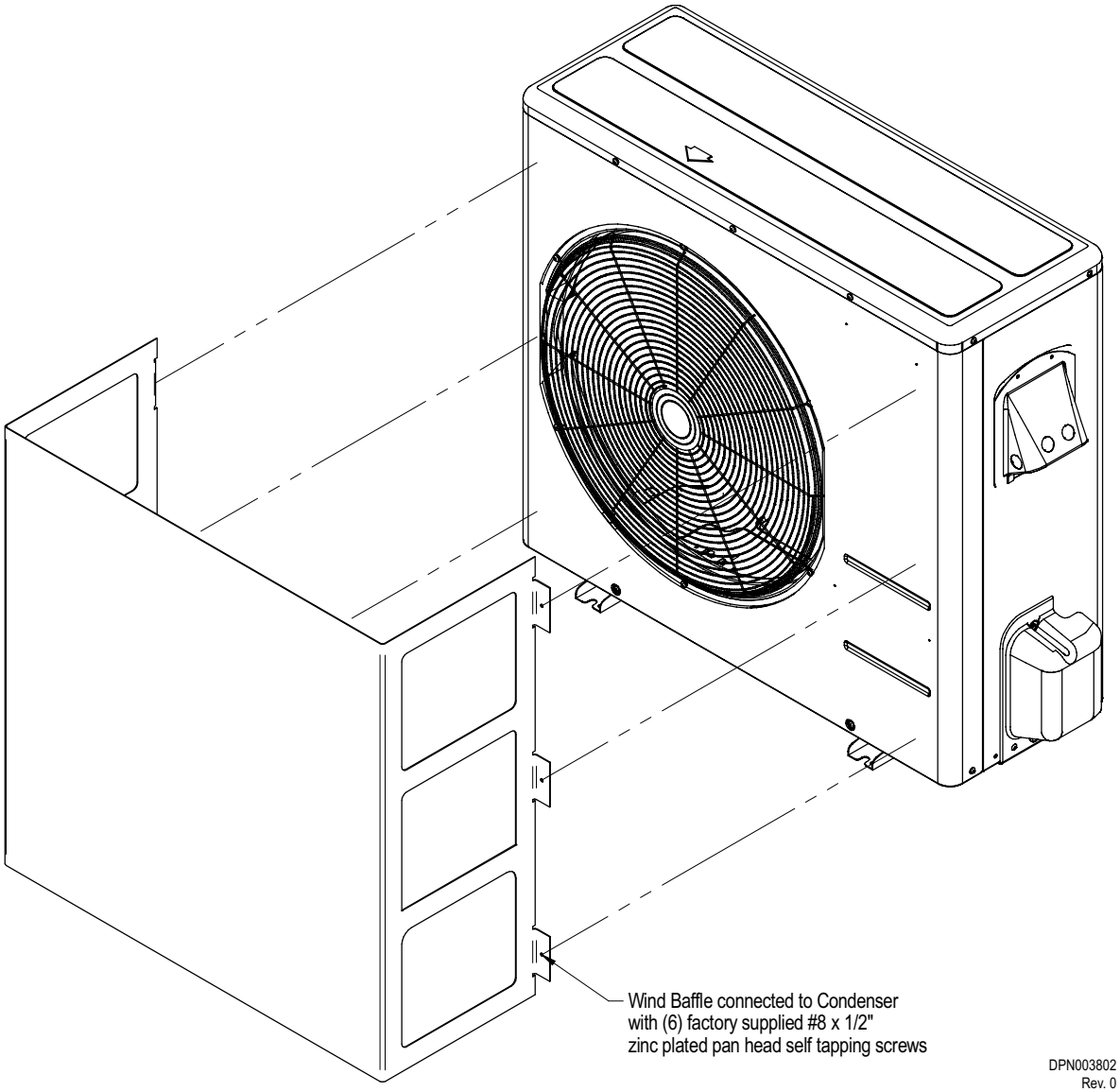


Figure 4-8 Wind baffle, SRC24 outdoor unit

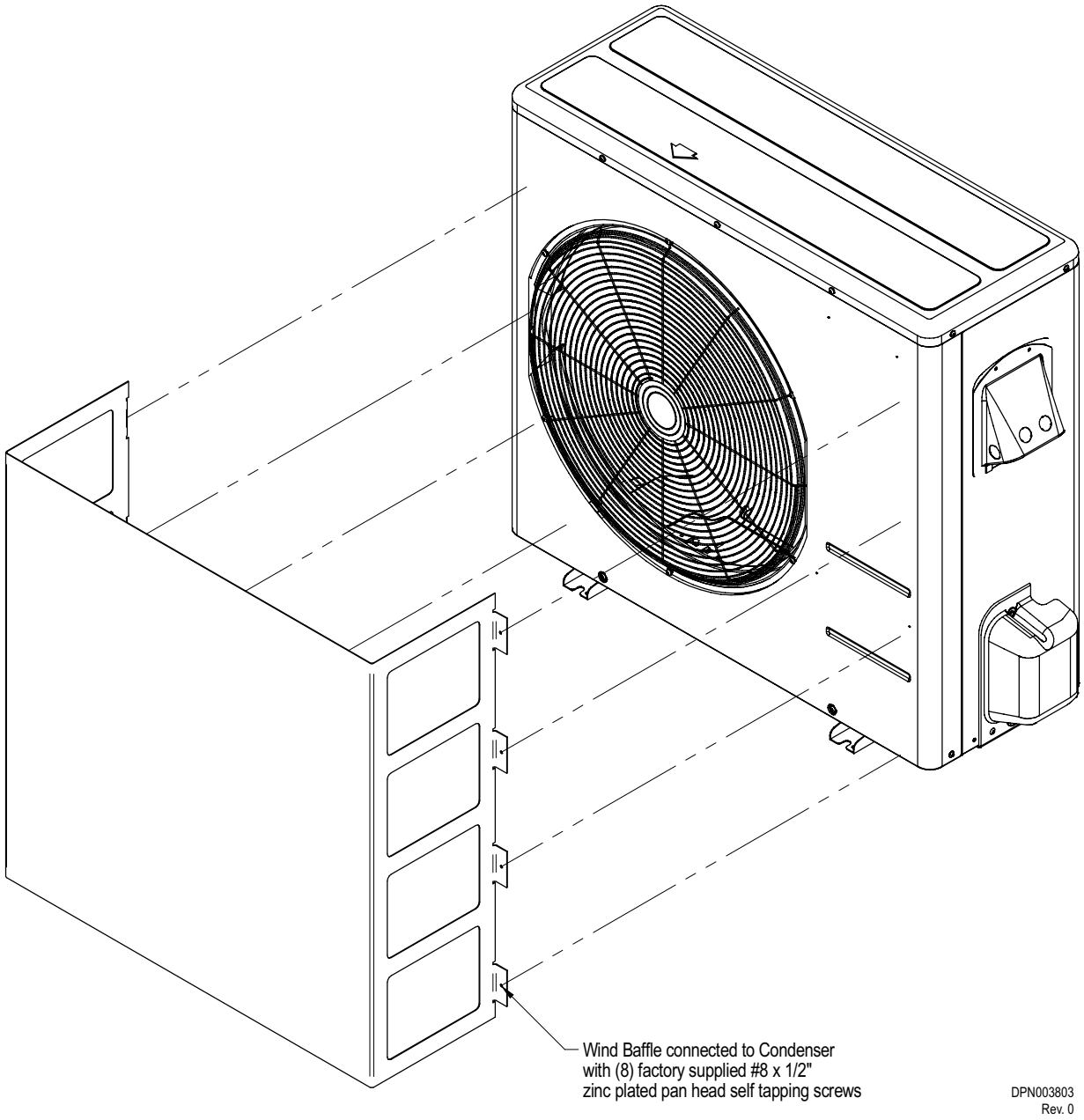
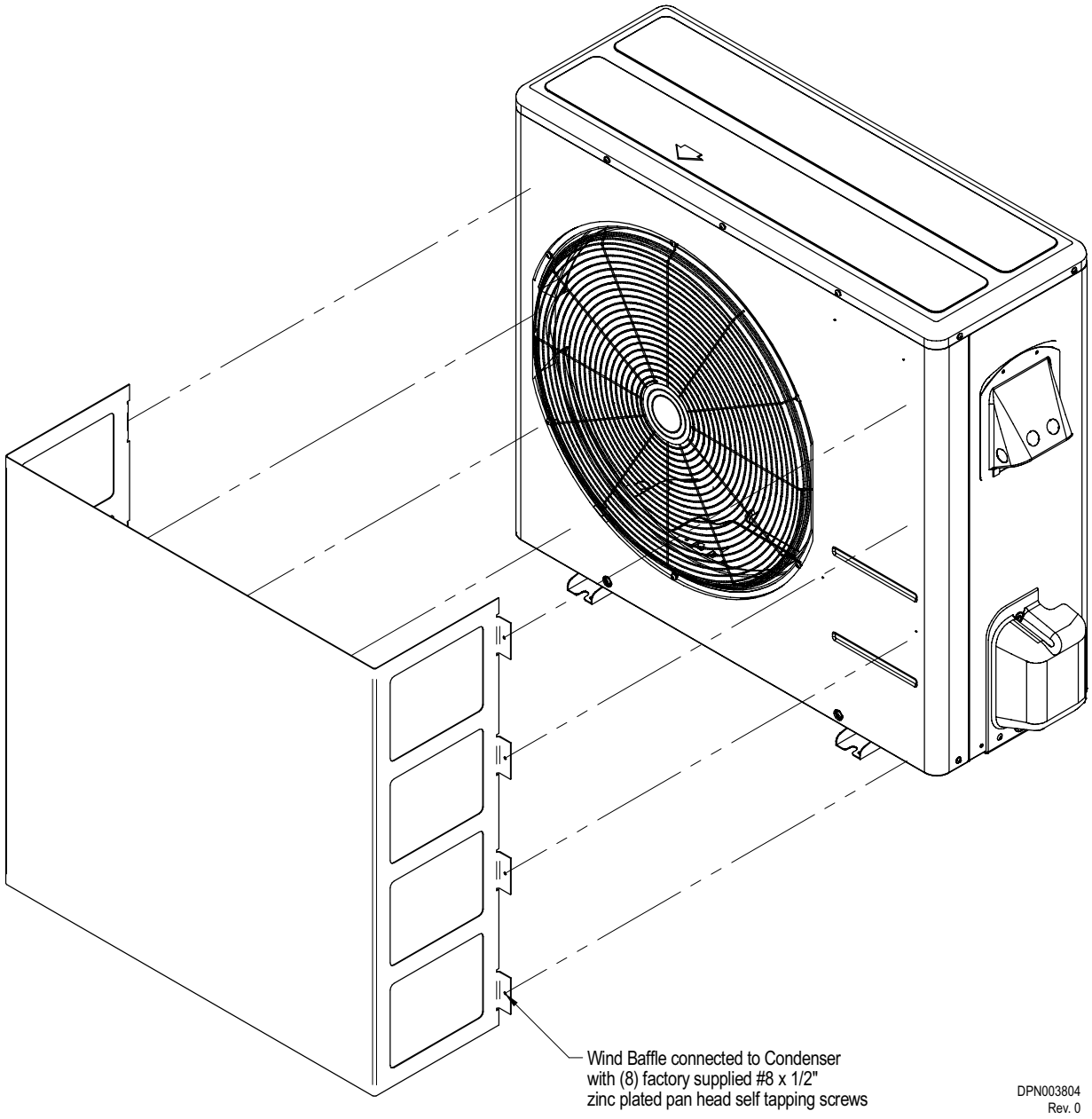
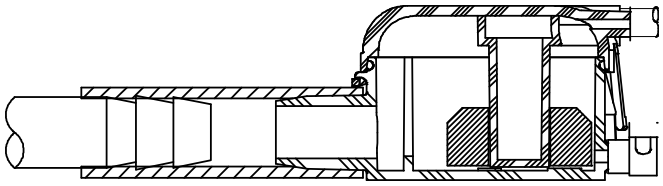


Figure 4-9 Wind baffle, SRC36 outdoor unit



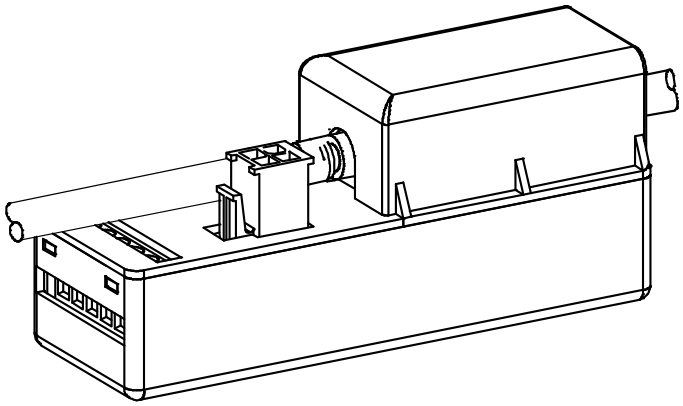
4.5 Condensate Pump Dimensions

Figure 4-10 Condensate-pump reservoir dimensions



Dimensions (H x L x W), in. (mm)
3.25 x 1.5 x 1.4 (83 x 38 x 36)

Figure 4-11 Condensate-pump control unit/pump dimensions

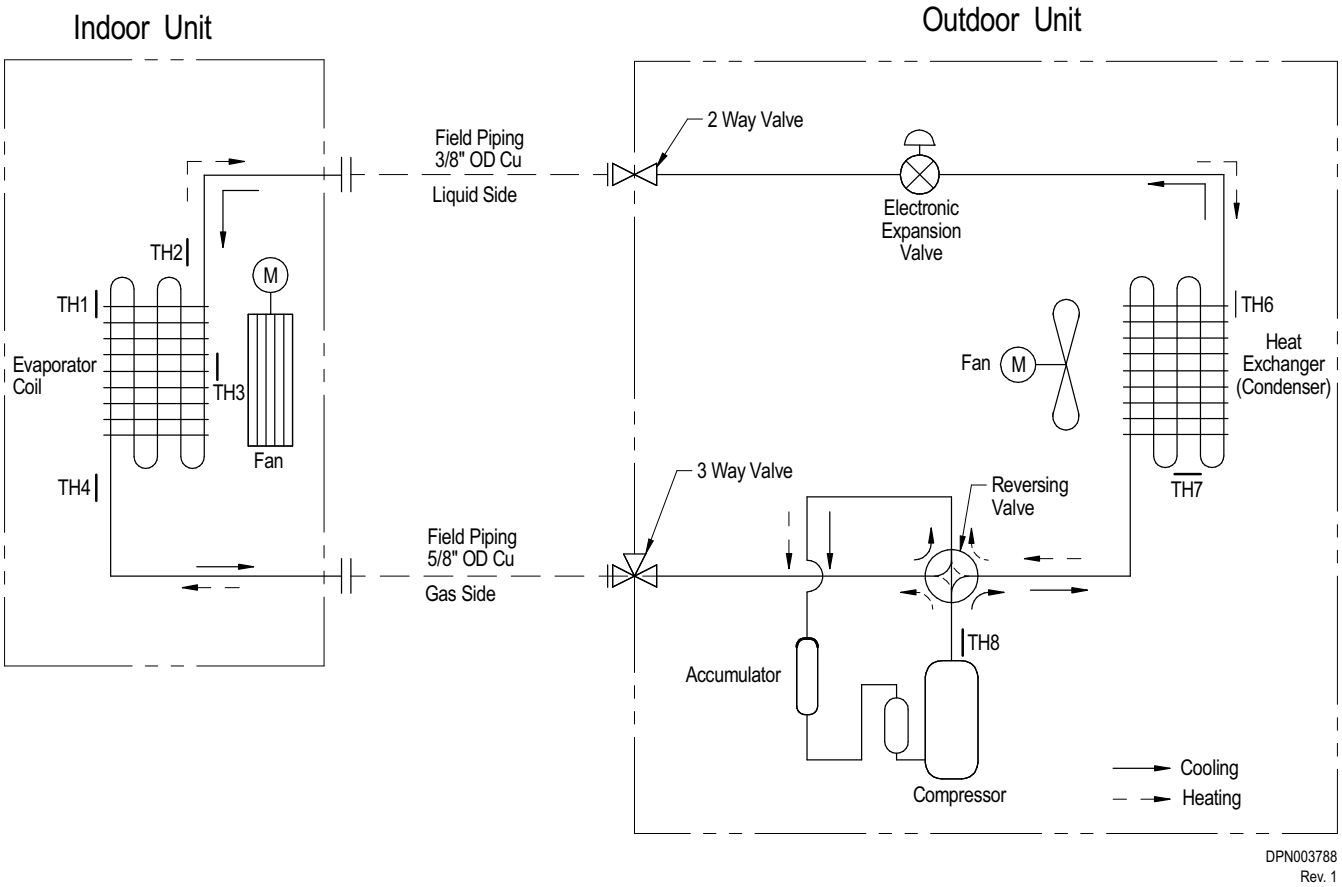


Dimensions (H x L x W), in. (mm)
4.4 x 1.4 x 1.75 (112 x 36 x 45)

5.0 Piping

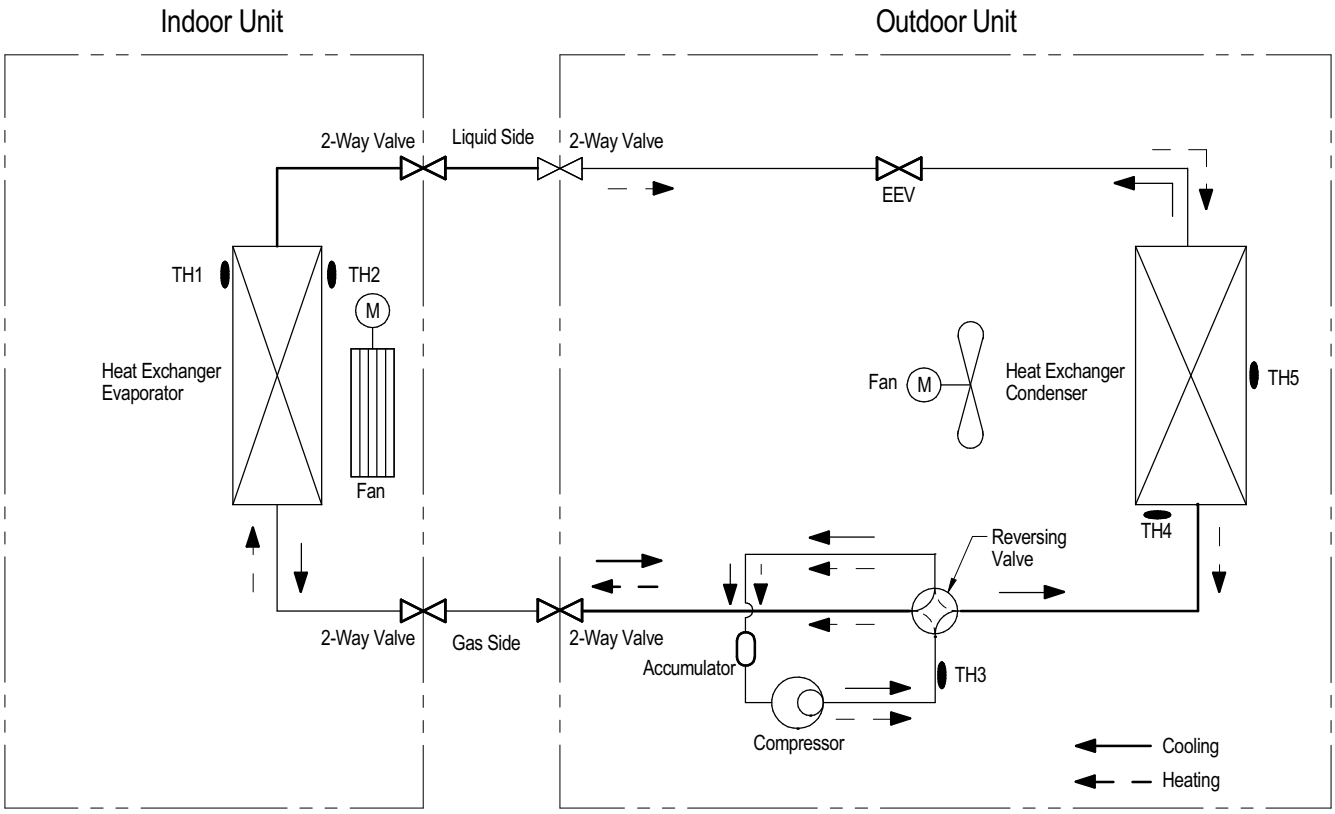
5.1 Refrigerant-flow Diagrams

Figure 5-1 Refrigerant-flow diagram, SRC18



Thermistor	Description	PCB Connector
TH1	Indoor air temperature thermistor	CN-TH1 (indoor)
TH2	Evaporator inlet temperature thermistor	
TH3	Evaporator middle temperature thermistor	CN-TH2 (indoor)
TH4	Evaporator outlet temperature thermistor	
TH6	Outdoor air temperature thermistor	CN-TH1 (outdoor)
TH7	Condensing temperature thermistor	
TH8	Discharge pipe temperature thermistor	CN-TH2 (outdoor)

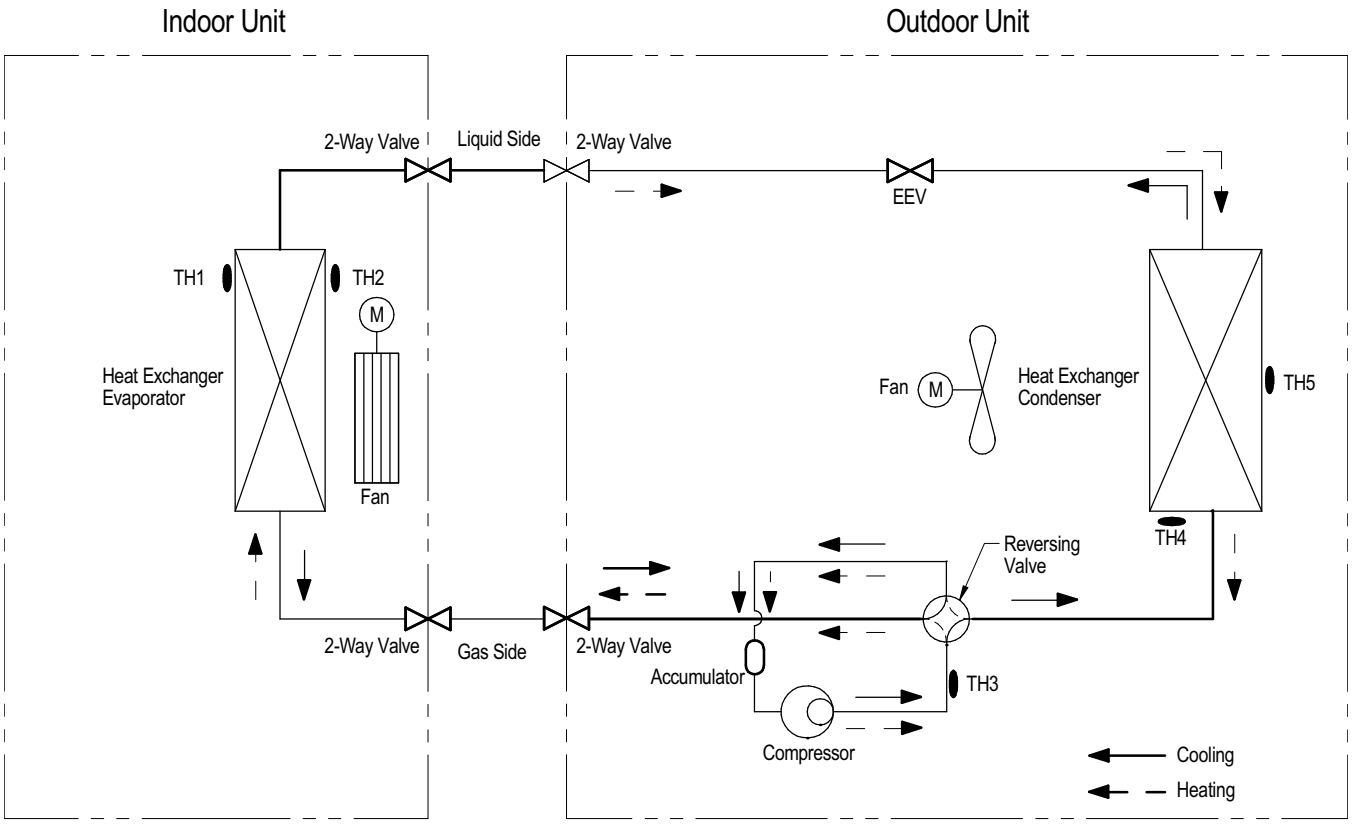
Figure 5-2 Refrigerant-flow diagram, SRC24



DPN003789
Rev. 0

Thermistor	Description	PCB Connector
TH1	Suction air temperature thermistor	CN-TH1 (indoor)
TH2	Evaporating middle temperature thermistor	CN-TH3 (indoor)
TH3	Discharge pipe temperature thermistor	CN-TH3 (outdoor)
TH4	Condensing temperature thermistor	CN-TH2 (outdoor)
TH5	Outdoor air temperature thermistor	

Figure 5-3 Refrigerant-flow diagram, SRC36



DPN003800
Rev. 0

Thermistor	Description	PCB Connector
TH1	Suction air temperature thermistor	CN-TH1 (indoor)
TH2	Evaporating middle temperature thermistor	CN-TH3 (indoor)
TH3	Discharge pipe temperature thermistor	CN-TH3 (outdoor)
TH4	Condensing temperature thermistor	CN-TH2 (outdoor)
TH5	Outdoor air temperature thermistor	

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6.0 Electrical Data

Table 6-1 Indoor and Outdoor unit electrical data

Model	Nom. Tons	Compressor Qty.	Compressor (A) Cool/Heat	Fan Qty.	Outdoor Unit Fan (A)	Indoor Unit Fan (A)	MCA (A)	MOP (A)
SRC18	1-1/2	1	14.6/14.6	1	0.25	0.40	19	25
SRC24	1-3/4	1	17.3/17.3	1	0.25	0.5	23	35
SRC36	2-3/4	1	17.3/17.3	1	0.25	0.5	23	35

6.1 SRC18 Unit Wiring Diagrams

Figure 6-1 Wiring diagram, SRC18 indoor unit

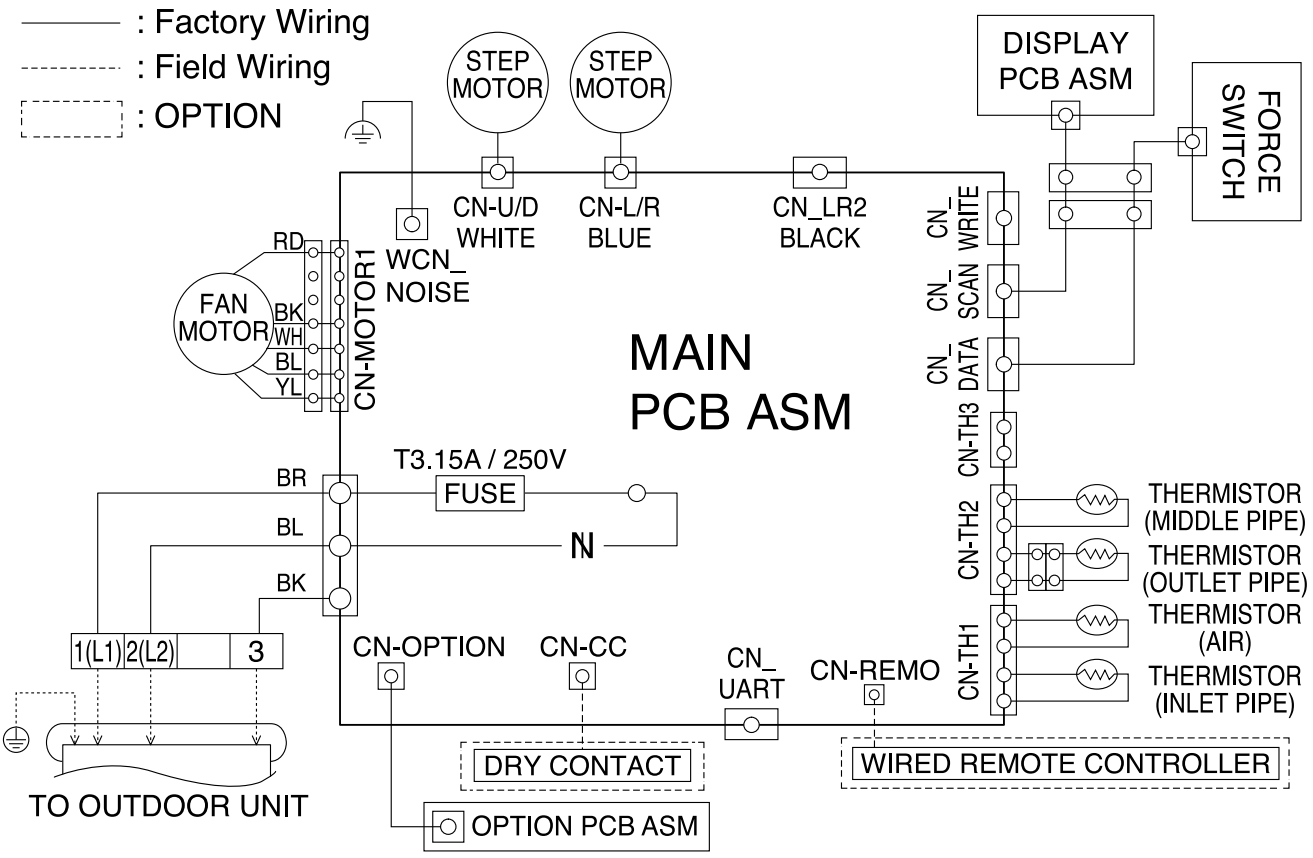
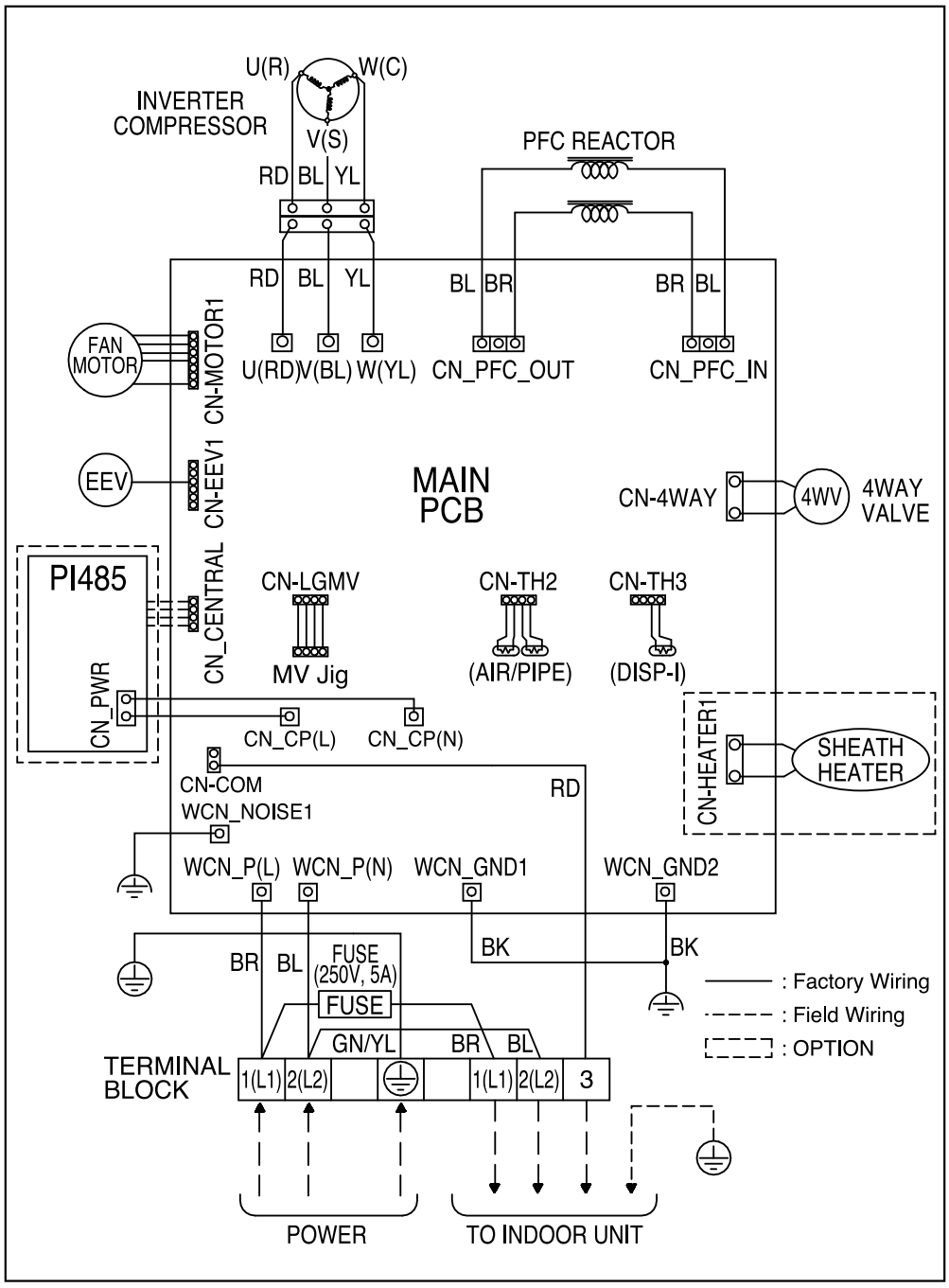


Figure 6-2 Wiring diagram, SRC18 outdoor unit



6.2 SRC24 and SRC36 Unit Wiring Diagrams

Figure 6-3 Wiring diagram, SRC24 and SRC36 indoor unit

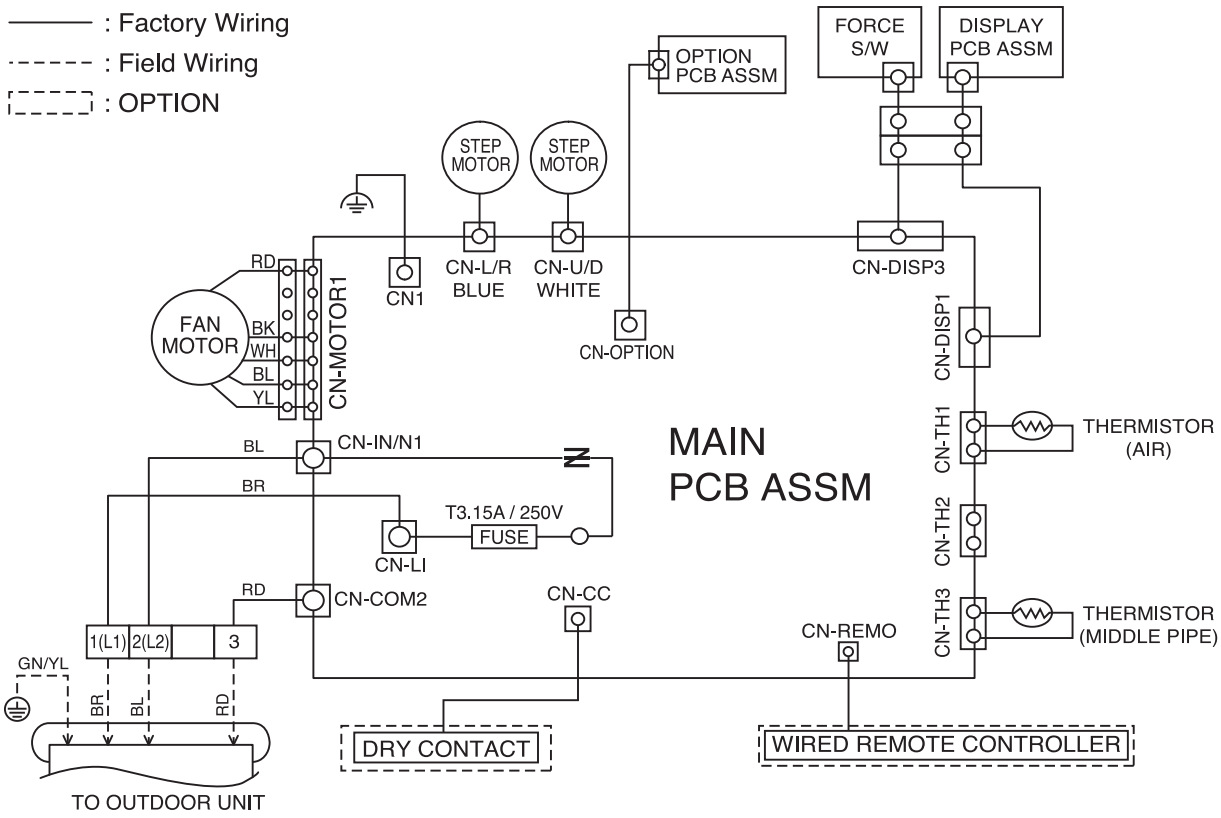
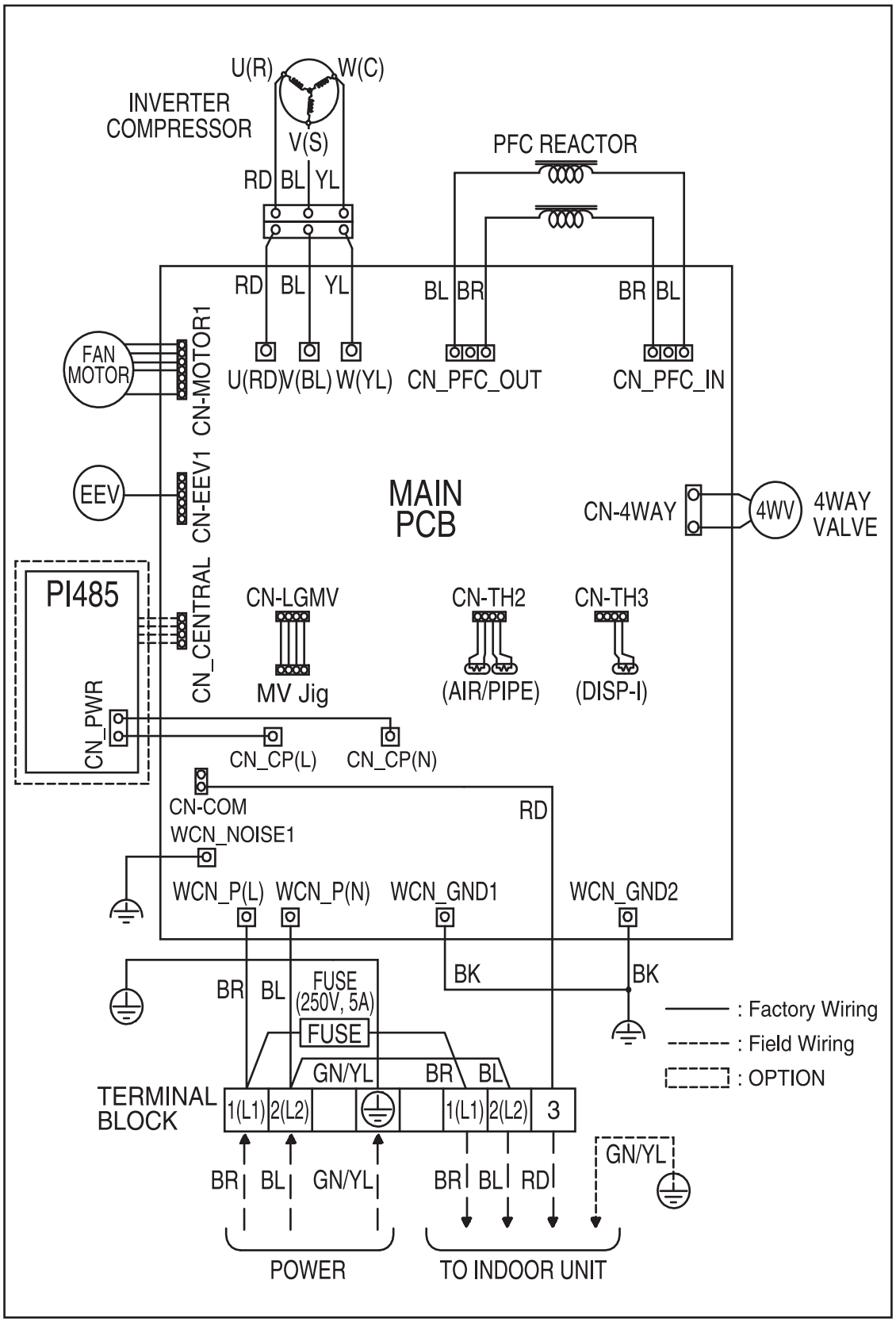


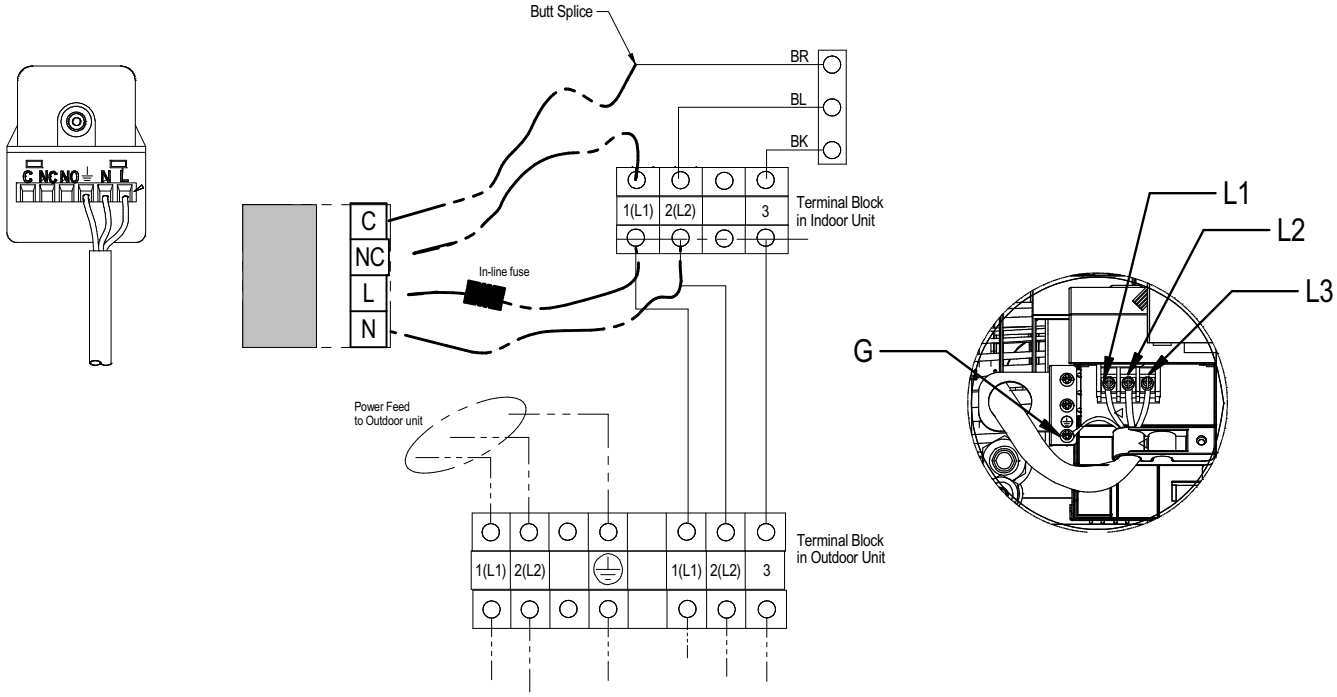
Figure 6-4 Wiring diagram, SRC24 and SRC36 outdoor unit



6.3 Condensate-pump Wiring

Connect pump connects to indoor unit at L1, L2 and ground. The pump-terminal NO is reserved for customer-supplied alarm.

Figure 6-5 Condensate pump wiring diagram



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7.0 Application Guidelines

7.1 Placement and Location Considerations

Select a location to install the outdoor unit that meets the following conditions:

- Where the unit will not be subjected to direct thermal radiation from other heat sources.
- Where operating sound from the unit will not disturb inhabitants of surrounding buildings.
- Where the unit will not be exposed to direct, strong winds.
- Where there is enough strength to bear the weight of the unit.
- Include space for drainage to ensure condensate flows properly out of the unit when it is in heating mode.
- Include enough space for drainage to ensure condensate flows properly out of the unit when it is in heating mode.
- Include enough space for air flow and for service access.
- To avoid the possibility of fire, do not install the unit in an area where combustible gas may generate, flow, stagnate, or leak.
- Do not install the unit in a location where acidic solution and spray (sulfur) are often used.
- Do not use the unit in environments where oil, steam, or sulfuric gas are present.
- Install a fence to prevent vermin from crawling into the unit or unauthorized individuals from accessing it.

To ensure that the outdoor unit operates properly, certain measures are required in locations where there is a possibility of heavy snowfall or severe wind chill or cold.

1. Prepare for severe winter wind chills and heavy snowfall, even in areas of the country where these are unusual phenomena.
2. Position the outdoor unit so that its air-flow fans are not buried by direct, heavy snowfall. If snow piles up and blocks the air flow, the system may malfunction.
3. Remove any snow that has accumulated 3-15/16 inches or more on the top of the outdoor unit.
4. Place the unit on a raised platform at least 19-11/16 inches higher than the average annual snowfall for the area. In environments where there is a possibility of heavy snow, the frame height must be more than 2 times the amount of average annual snowfall and should not exceed the width of the outdoor unit. If the frame width is wider than the outdoor unit, snow may accumulate.
5. Install a snow-protection hood.
6. To prevent snow and heavy rain from entering the outdoor unit, install the suction and discharge ducts facing away from direct winds.
7. Additionally, the following conditions should be taken into consideration when the unit operates in defrost mode:
    - If the outdoor unit is installed in a highly humid environment (near an ocean, lake, etc.), ensure that the site is well-ventilated and has a lot of natural light, for example, install on a rooftop.
    - Sidewalks or parking lots near the outdoor unit may accumulate moisture that can turn into ice after the unit operates in defrost mode.

The indoor unit may take longer to provide heat, or heating performance will be reduced in winter if the unit is installed:

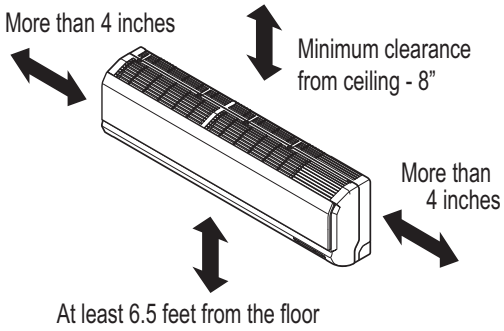
1. In a narrow, shady location.
2. Near a location that has a lot of ground moisture.
3. In a highly-humid environment.
4. In an area in which condensate does not drain properly.

7.1.1 Indoor Unit Location

Follow recommended practices when choosing an indoor location for the wall-mounted indoor unit.

- Keep unit away from any indoor steam or excessive heat.
- No obstacles should be placed around the unit.
- Condensation drain (leakage piping) should be routed away from the unit.
- Do not install near a doorway.
- Use a metal detector to locate studs in the walls. Anchor unit following stud location to prevent damage to the wall.
- Clearance gap between any wall or enclosure and the left or right side of the unit must be greater than 4 inches, **Figure 7-1**.
- From the top of the unit to the ceiling, there must be greater 8 inches of clearance, see **Figure 7-1**.
- Unit should be at least 6.5 feet from the floor for adequate clearance.

Figure 7-1 Indoor unit clearance requirements



7.1.1.1 Condensate Pump Location

The optional, field-installed condensate pump can be located inside or outside of the SRC evaporator section, below the bottom of the drain pan.

- The maximum suction lift of the pump is 3 ft (1 m). The control unit/pump cannot be installed more than 3 ft (1 m) higher than the collection reservoir.
- Maximum horizontal run to the gravity-fed drain is 60 ft (18 m), which results in a drop in flow-rate of 10 to 15%.
- The end of the discharge tubing that is directed into the gravity-fed drain must be positioned so that it is nor more than 3 ft (1 m) below (vertically) the collection reservoir. Failure to do so may create a siphon and cause the pump to lose its prime. The pump will re-prime itself during each cycle, which causes noisy operation and shorten the life of the pump.

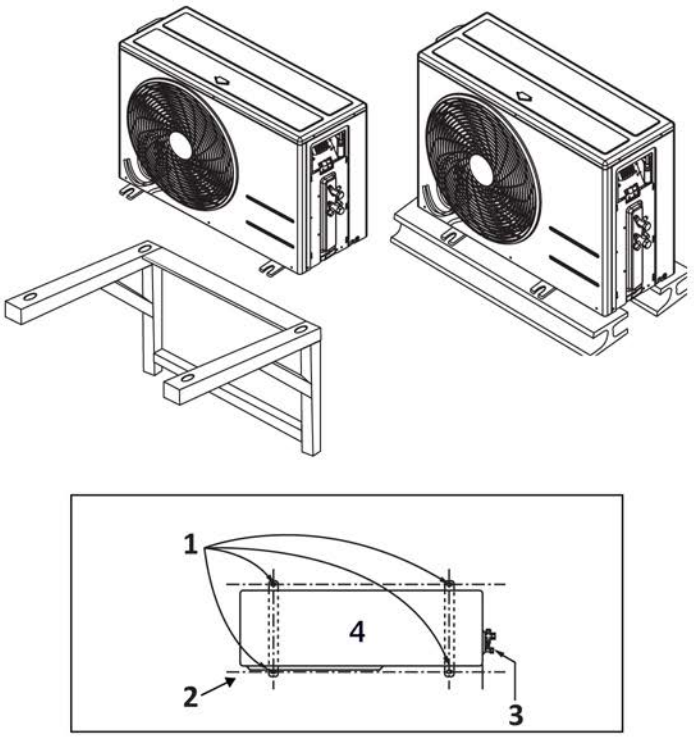
7.1.2 Mounting the Outdoor Unit

Securely attach the outdoor unit to a condenser pad, base rails, or another mounting platform that is securely anchored to the ground or building structure. Attach the outdoor unit with a bolt and nut on a concrete or rigid mount. See **Figure 7-2**. Follow applicable local codes for clearance, mounting, anchor and vibrations attenuation requirements.

NOTE

All referenced materials are field-supplied. Images are not to scale.

Figure 7-2 Outdoor unit mounting methods



No.	Description	No.	Description
1	Bolt placement and Anti-vibration pad	3	Piping connection
2	Foundation	4	Top of unit

7.1.2.1 Mounting Platform

The underlying structure or foundation must be designed to support the weight of the unit. Avoid placing the unit in a low-lying area where water may accumulate. When installing the outdoor unit on the wall or roof top, anchor the mounting base securely to account for wind, earthquake or vibration.

7.1.2.2 Tie-downs and Wind Restraints

The strength of the inverter system frame is adequate to be used with field-provided wind restraint tie-downs. The overall tie-down configuration must be approved by a local, professional engineer.

NOTE
Always refer to local code when designing a wind-restraint system.

7.1.2.3 Snow and Ice Conditions

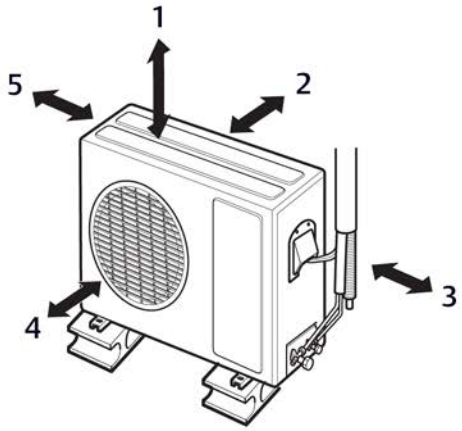
In climates that experience snow build-up, place the unit on a raised platform to ensure condenser air flow. The raised support platform must be high enough to allow the unit to remain above possible snow drifts. Mount the unit on a field-provided snow stand at a minimum height that is equal to the average annual snowfall plus 20 inches. Design the mount base to prevent snow accumulation on the platform in front or back of the unit case. If necessary, provide a field fabricated hood to keep snow and ice and/or drifting snow from accumulating on the coil surfaces. Use inlet and discharge duct or hoods to prevent snow or rain from accumulating on the fan inlet and outlet guards. Best practice prevents snow from accumulating on top of the unit. Consider the tie-down requirements in case of high winds or where required by local codes.

CAUTION
Risk of run-off water freezing on sidewalks and driveways. Can cause falls and injuries. When selecting the location for the outdoor unit, be sure to choose an area where run-off from defrost will not accumulate and freeze on sidewalks or driveways.

7.1.2.4 Outdoor Unit Clearance

Specific clearance requirements are for the wall-mount systems. **Figure 7-3** shows the overall minimum clearances that must be observed for safe operation and adequate airflow around the outdoor unit.

Figure 7-3 Outdoor-unit clearances



No.	Description	No.	Description
1	More than 24 inches.	4	More than 28 inches.
2	More than 12 inches.	5	More than 12 inches.
3	More than 24 inches.		

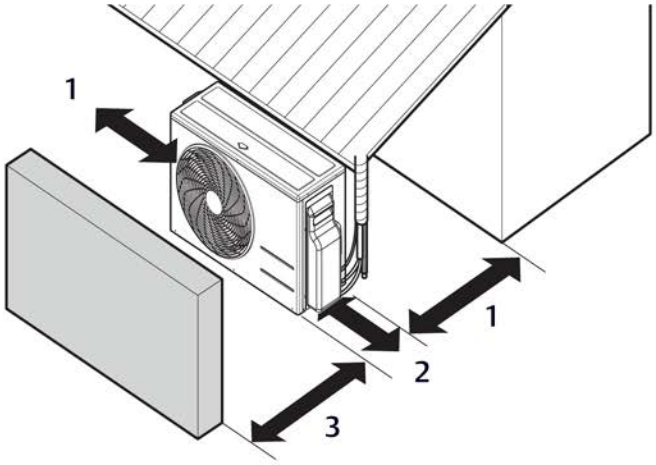
When placing the outdoor unit under an overhang, awning, sunroof or other “roof-like” structure, observe the clearance requirements (as shown in **Figure 7-4**) for height in relation to the unit. This clearance ensures that heat radiation from the condenser is not restricted around the unit. See **Figures 7-5** and **7-6** for recommendations when other obstacles are present.

Adhere to all clearance requirements if installing the unit on a roof. Be sure to level the unit and ensure that the unit is adequately anchored. Consult local codes for roof-top mounting requirements.

NOTE

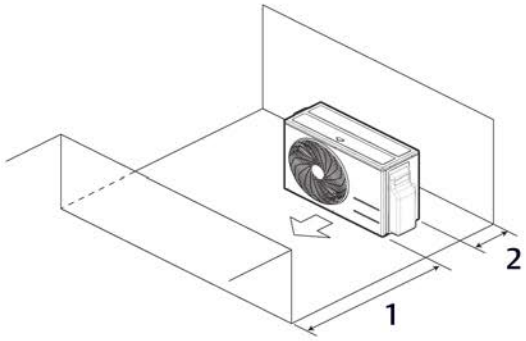
Do not place the unit where animals and/or plants will be in the path of the warm air, or where the warm air and/or noise will disturb neighbors.

Figure 7-4 Outdoor-unit sunroof/awning clearances



No.	Description
1	More than 12 inches.
2	More than 24 inches.
3	More than 28 inches.

Figure 7-5 Clearances when there are obstacles on both air-inlet and air-outlet sides

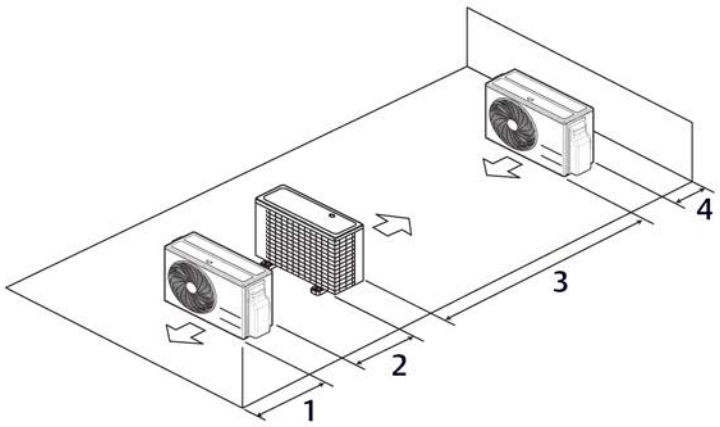


No.	Description
1	More than 28 inches.
2	More than 12 inches.

NOTE

In **Figures 7-5** and **7-6**, *the obstacle on the outlet side is lower than the outdoor unit.*

Figure 7-6 Clearances when there are obstacles above and on both air-inlet and air-outlet sides



No.	Description	No.	Description
1	More than 28 inches.	3	79 inches
2	24 inches	4	More than 12 inches.

7.2 Refrigerant Piping Design

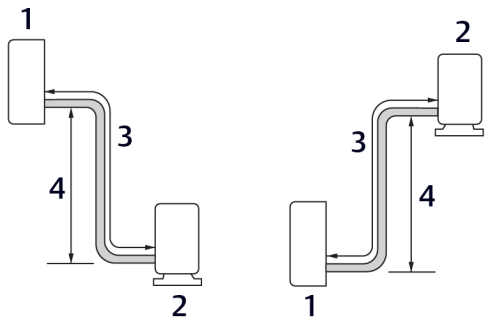
7.2.1 Device Connection Limitations

Liebert SRC systems consist of one outdoor unit and one indoor unit. One of the most critical elements of a system is the refrigerant piping. **Table 7-1** lists pipe-length limits that must be followed in the design of an SRC system. Refer to **Figure 7-7** for maximum length and elevation of piping.

Table 7-1 Refrigerant-piping system limitations

Pipe Length (ELF = Equivalent length of pipe in feet)	Longest total equivalent piping length	SRC18	SRC24	SRC36
		98.4	164.0	164.0
	Shortest total equivalent piping length	9.8	9.8	9.8
	Distance between fittings and indoor units or outdoor units	≥20 in.	≥20 in.	≥20 in.
Elevation (All elevation limitations are measured in actual feet.)	If outdoor unit is above indoor unit.	49.2	98.4	98.4
	If outdoor unit is below indoor unit.	49.2	98.4	98.4
Additional refrigerant needed (oz/ft)		0.22	0.38	0.38

Figure 7-7 System layout



No.	Description	No.	Description
1	Indoor unit	3	Maximum length
2	Outdoor unit	4	Maximum elevation

7.2.2 Selecting Field-supplied Copper Tubing

Copper is the only approved refrigerant-pipe material for use with the Liebert SRC, and Emerson recommends seamless phosphorous deoxidized ACR type copper pipe, hard-drawn rigid type “K” or “L,” or annealed-tempered, copper pipe.

- Drawn temper (rigid) ACR copper tubing is available in sizes 3/8 through 2-1/8 inches (ASTM B 280, clean, dry, and capped).
- Annealed temper (soft) ACR copper tubing is available in sizes 1/4 through 2-1/8 inches (ASTM B 280, clean, dry, and capped).

NOTE

Tube wall thickness should meet local code requirements and be approved for an operating pressure of 551 psi. If local code does not specify wall thickness, Emerson suggests using tube thickness per ***Table 7-2****. When bending tubing, try to keep the number of bends to a minimum, and use the largest radii possible to reduce the equivalent length of installed pipe. Also, bending radii greater than 10 pipe diameters can minimize pressure drop. Be sure that no traps or sags are present when rolling-out soft copper-tubing coils.*

Table 7-2 ACR copper-tubing material

Type	Seamless phosphorous deoxidized
Class	UNS C12200 DHP
Straight Lengths	H58 temper
Coils	O60 temper

Copper Expansion and Contraction

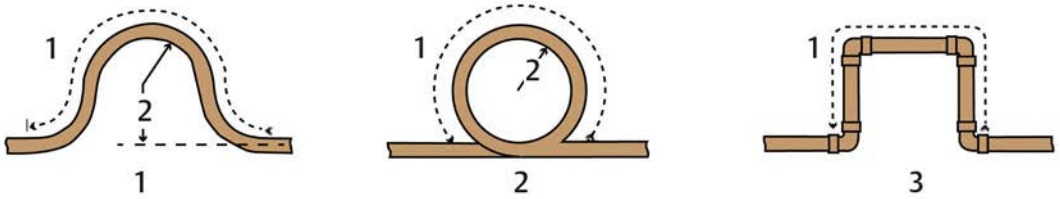
Under normal operating conditions, the vapor pipe temperature of a Liebert SRC can vary as much as 280°F. With this large variance in pipe temperature, the designer must consider pipe expansion and contraction to avoid pipe and fitting fatigue failures.

Table 7-3 Linear thermal expansion of copper tubing, in inches

Pipe Length[1]	Fluid Temperature, °F																			
	35°	**40°**	**45°**	**50°**	**55°**	**60°**	**65°**	**70°**	**75°**	**80°**	**85°**	**90°**	**95°**	**100°**	**105°**	**110°**	**115°**	**120°**	**125°**	**130°**
10	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.12	0.13	0.14	0.15	0.15
20	0.08	0.08	0.10	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.22	0.23	0.26	0.28	0.29	0.30
30	0.12	0.12	0.15	0.18	0.20	0.21	0.23	0.24	0.26	0.27	0.29	0.30	0.32	0.33	0.32	0.35	0.39	0.42	0.44	0.45
40	0.16	0.16	0.20	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.44	0.43	0.46	0.52	0.56	0.58	0.60
50	0.20	0.20	0.25	0.30	0.33	0.35	0.38	0.40	0.43	0.45	0.48	0.50	0.53	0.55	0.54	0.58	0.65	0.70	0.73	0.75
60	0.24	0.24	0.30	0.36	0.39	0.42	0.45	0.48	0.51	0.54	0.57	0.60	0.63	0.66	0.65	0.69	0.78	0.84	0.87	0.90

1. Pipe length baseline temperature = 0°F. “Expansion of Carbon, Copper and Stainless Steel Pipe,”

Figure 7-8 Coiled expansion loops and offsets



No.	Description	No.	Description
1	Length (L)	1	Large tubing U-bend (greater than 3/4 in.)
2	Radii (R)	2	Loop
		3	Small tubing U-bend (less than 3/4 in.)

Table 7-4 Radii of coiled expansion loops and developed lengths of expansion offsets

Anticipated Linear Expansion (LE) (in.)		Nominal Tube Size (OD) in.			
		1/4	3/8	1/2	3/4
1/2	R[1]	6	7	8	9
	L[2]	38	44	50	59
1	R[1]	9	10	11	13
	L[2]	54	63	70	83
1-1/2	R[1]	11	12	14	16
	L[2]	66	77	86	101
2	R[1]	12	14	16	19
	L[2]	77	89	99	117
2-1/2	R[1]	14	16	18	21
	L[2]	86	99	111	131
3	R[1]	15	17	19	23
	L[2]	94	109	122	143
3-1/2	R[1]	16	19	21	25
	L[2]	102	117	131	155
4	R[1]	17	20	22	26
	L[2]	109	126	140	166

7.2.3 Piping Installation and Layout Best Practices

7.2.3.1 Layout Procedure

Physical pipe length—Actual length of straight segment(s) of pipe.

Equivalent pipe length—Actual length of pipe plus equivalent lengths of elbows, Y-branches and valves.

1. Draft a one-line diagram of the proposed piping system connecting the outdoor unit to heat-recovery and indoor units. Follow the pipe limitations listed in **Table 7-1**.
2. Calculate the physical length of each pipe segment and note it on the drawing.
3. Calculate the equivalent pipe length of each pipe segment.

7.2.3.2 Using Elbows

Filed-supplied elbows are allowed as long as they are designed for use with R410A refrigerant. The designer, however, should be cautious with the quantity and size of fittings used, and must account for the additional pressure losses in equivalent-pipe-length calculation.

The equivalent pipe length of each elbow must be added to each pipe segment, **Table 7-5**.

Table 7-5 Equivalent piping length for piping components

Component	Size (in.)				
Elbow (ft)	1/4	3/8	1/2	5/8	3/4
	0.5	0.6	0.7	0.8	1.2

7.2.3.3 Field-provided Isolation Ball Valves

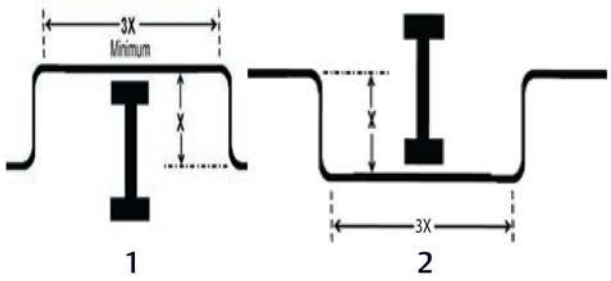
Emerson allows the installation of field-supplied ball valves with Schrader ports at each indoor unit. Full-port isolation ball valves with Schrader ports (positioned between valve and indoor unit) rated for use with R410A refrigerant should be used on both the liquid and vapor lines.

If valves are not installed and a single indoor unit must be removed or repaired, the entire system must be shut down and evacuated. Position valves with a minimum distance of 3 to 6 inches of pipe on either side of the valve, and placed between 6 and 12 inches from the run-out pipe to the upstream main pipe. If ball valves are installed closer that this to the indoor unit, a section of pipe becomes a dead zone where oil may accumulate when the valves are closed.

7.2.3.4 Obstacles

When an obstacle, such as an I-beam or concrete T, is in the path of the planned refrigerant-pipe run, it is best practice to route the pipe over the obstacle. If adequate space is not available to route the insulated pipe over the obstacle, then route the pipe under the obstacle. In either case, it is imperative that the length of the horizontal section of pipe above or below the obstacle be a minimum of 3-times the longest vertical rise (or fall) at either end of the segment, **Figure 7-9**.

Figure 7-9 Installing piping above and below an obstacle



No.	Description
1	Above an obstacle
2	Below an obstacle

7.2.3.5 In-line Refrigeration Components

Components such as oil traps, solenoid valves, filter-dryers, sight glasses, tee fittings and other after-market accessories are not permitted on the refrigerant piping system between the outdoor unit and the indoor unit. Liebert SRC systems are provided with redundant systems that assure oil is properly returned to the compressor. Sight glasses and solenoid valves may cause vapor to form in the liquid stream. Over time, dryers may deteriorate and introduce debris into the system. The designer and installer should verify that the refrigerant-piping system is free of traps, sagging pipes, sight glasses, filter dryers, etc.

7.2.3.6 No Pipe Size Substitutions

Use only the pipe size recommended by this manual. Using a different size is prohibited and may result in a system malfunction or failure to work at all.

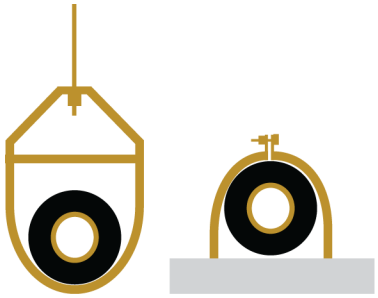
7.2.3.7 Pipe Supports

NOTE

A properly-installed pipe system should be adequately supported to avoid pipe sagging. Sagging pipes become oil traps that lead to equipment malfunction.

Pipe supports should never touch the pipe wall. Insulate the pipe first because pipe supports must be install outside (around) the primary pipe-insulation jacket, **Figure 7-10**. Use Clevis hangers with shield between the hangers and insulation. Field-provided pipe supports should be designed to meet local codes. If allowed by code, use fiber straps or split-ring hangers suspended from the ceiling on all-thread rods (fiber straps or split-ring hangers may be used as long as they do not compress the pipe insulation). Place a second layer of insulation of the pipe-insulation jacket to prevent chafing and compression of the primary insulation withing the confines of the support-pipe clamp.

Figure 7-10 Pipe-hanger details



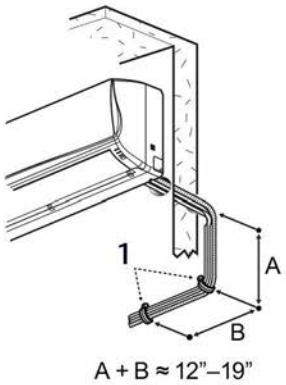
A properly-installed pipe system has sufficient supports to prevent pipes from sagging during the life of the system. As necessary, place supports closer for segments where potential sagging could occur. Maximum spacing of the pipe supports must meet local codes.

If local codes do not specify pipe-support spacing, support the pipes as follows:

- Maximum of 5 feet on center for straight segments of pipe up to 3/4-in. outside diameter.
- Maximum of 6 feet on center for pipe up to 1-in. outside diameter.
- Maximum of 8 feet on center for pipe up to 2-in. outside diameter.

Wherever the pipe changes direction, place pipe clamps within 12 inches on one side and within 12 to 19 inches of bend on the other side, as shown in **Figure 7-11**.

Figure 7-11 Typical pipe-support location for a change in pipe direction

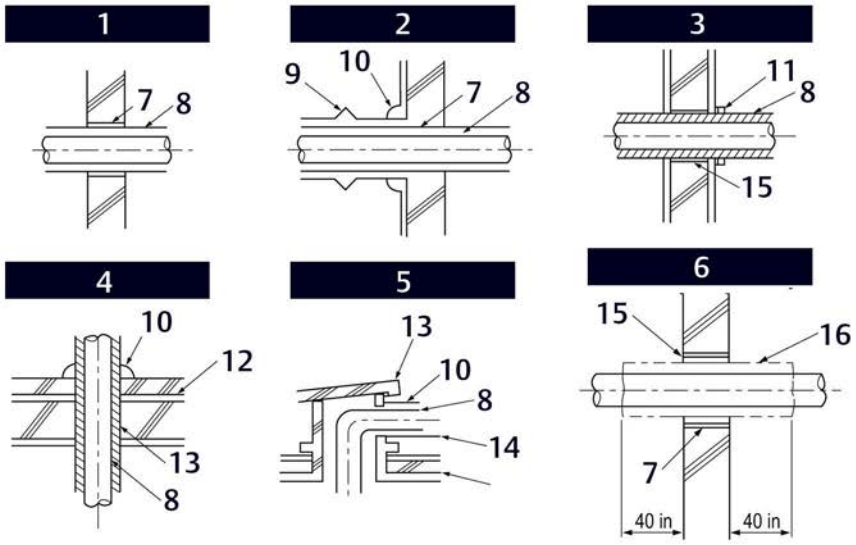


No.	Description
1	Pipe clamps

7.2.3.8 Pipe Sleeves at Penetrations

Emerson requires that all pipe penetrations through walls, floors, and pipes buried underground be properly-insulated and routed through an appropriate wall sleeve of sufficient size to prevent compression of refrigerant-pipe insulation and free movement of the pipe withing the sleeve, **Figure 7-12**.

Figure 7-12 Pipe sleeve options



No.	Description	No.	Description
1	Inside wall (concealed)	9	Lagging
2	Outside wall	10	Caulk
3	Outside wall (exposed)	11	Band
4	Floor (fire-resistance)	12	Water-resistant layer
5	Roof pipe shaft	13	Sleeve with edge
6	Area between fire-resistant insulation and boundary wall	14	Lagging
7	Sleeve	15	Mortar or other fire-resistant caulk
8	Insulation	16	Fire-resistant insulation

NOTE

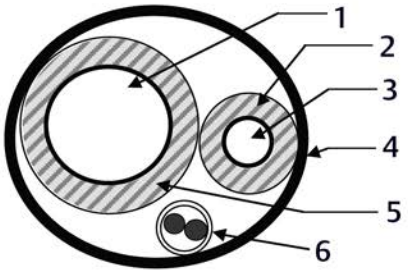
The diameter of the penetrations must be determined by the pipe diameter plus the thickness of the insulation.

7.2.3.9 Underground Refrigerant Piping

Refrigerant pipe installed underground should be routed inside a vapor-tight protective sleeve to prevent deterioration of the insulation and water infiltration. Refrigerant pipe installed inside underground casing must be continuous without any joints. Underground refrigerant pipe must be located at a level **below the frost line**.

Figure 7-13 shows the arrangement of refrigerant pipe and cable(s) in a conduit. **Table 7-6** shows conduit sizes for utility conduit.

Figure 7-13 Typical arrangement of pipe and cables in a utility conduit



No.	Description	No.	Description
1	Vapor line	4	Pipe sleeve
2	Insulation material	5	Insulation material
3	Liquid line	6	Power/Communication cable

Table 7-6 Utility-conduit sizes

Liquid Pipe[1]	Vapor Pipe[1]	
	3/8 (1-1/8[2,3])	5/8 (2-1/8[2,4])
3/8 (1-1/8)[3]	4	4

1. OD pipe diameter in inches. Values in parentheses indicate OD of pipe with insulation jacket.
2. Diameter of pipe with insulation. Thickness of pipe insulation is typical. Actual required thickness may vary based on surrounding ambient conditions and should be calculated and specified by the design engineer.
3. Insulation thickness (value in parenthesis) = 3/8 inch.
4. Insulation thickness (value in parenthesis) = 1 inch.

Table 7-7 Heat-pump unit refrigerant-pipe connections (All brazed type)

Model	Liquid Conn., in.	Vapor Conn., in.
SCR18, 24, 36	3/8	5/8

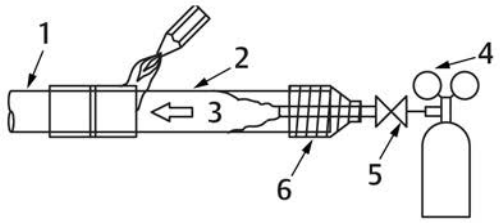
7.2.3.9.1 Brazing Practices

NOTE

It is imperative to keep the piping system free of contaminants and debris such as copper burrs, slag, or carbon dust during installation. Contaminants can result in mechanical failure of the system.

All joints are brazed in the field. Refrigeration-system components contain very small capillary tubes, small orifices, electronic expansion valves, oil separators, and heat exchangers that can easily become blocked. Proper system operation depends on the installer using best practices and utmost care while assembling the piping system.

Figure 7-14 Refrigerant-pipe brazing



No.	Description	No.	Description
1	Refrigerant piping	4	Pressure-reducing valve
2	Pipe to be brazed	5	Valve
3	Nitrogen	6	Taping

- While brazing, use a dry-nitrogen purge operating at a minimum pressure of 3 psig and maintain a steady flow.
- Before assembly, use dry nitrogen to blow clean all pipe sections.
- Use a tubing cutter, do not use a saw to cut pipe. De-burr and clean all cuts before assembly.
- Store pipe stock in a dry place. Keep pipe capped and clean.
- Use adapters to assemble different sizes of pipe.
- Do not use flux, soft solder, or anti-oxidant agents.
- Use a 15% silver phosphorous copper-brazing alloy to avoid overheating and produce good flow.
- Protect isolation valves, electronic expansion valves, and other heat-sensitive control components from excessive heat with a wet rag or a heat-barrier spray product.

7.2.3.10 Piping Insulation

To prevent heat loss/heat gain through the refrigerant piping, all refrigerant piping, including liquid lines and vapor lines, must be insulated separately. Insulation must be a minimum 1/2-in. thick, and the thickness may need to be increased based on ambient conditions and local codes. All refrigerant piping, including field-supplied isolation ball valves, service valves, and elbows must be completely insulated using closed-cell pipe insulation. All insulation joints must be glued with no air gaps. Insulation material must fit snugly against the refrigerations pipe with now space between it and the pipe. Insulation passing through pipe hangers, inside conduit, and/or sleeves must not be compressed. Protect insulation inside hangers and supports with a second layer. All pipe insulation exposed to direct sunlight and deterioration-producing elements must be properly protected with a PVC-aluminum vapor-barrier jacket, or placed in a weather-resistant enclosure such as a pipe rack with a top cover. The design engineer should perform calculations to determine if the factory-supplied insulation jackets have sufficient thickness to meet local codes and to void sweating at job-site conditions. Maximum refrigerant-pipe temperature is 227°F. Minimum refrigerant-pipe temperature is –4°F. Add additional insulation if necessary.

7.2.3.11 Charging

Each outdoor unit is factory-charged (nameplate charge) for the evaporator as wells as a standard 25-ft line. Any time a line set is used longer than the standard 25-ft line-set length, the refrigerant charge must be adjusted.

You must adjust the charge based on how many feet of piping are added based on 0.22 or 0.38 oz of R410A per foot. The factory charge accommodates pipe lengths up to the standard length without requiring refrigerant removal.

NOTE

If you are uncertain of the unit charge, reclaim, evacuate and weigh-in the correct charge using the unit nameplate (capacity) charge adjusting for line sets longer than 24.6 or 41 ft. This will prevent interruptions to unit function and possible damage.

Example: A 30-ft line set is used, 5.4 additional feet x 0.38 oz per foot = Add 2.05 oz of R410A.

Table 7-8 Refrigerant charge capacity and Additional refrigerant per foot

Model	Pipe size		Standard Length, ft	Max. Elevation, ft	Max Length, ft	Min. Length, ft	Additional Refrigerant, oz/ft
	Vapor	Liquid					
All Models	5/8	3/8	24.6	49.2	98.4	9.8	0.38

7.3 Electrical Connections

7.3.1 Outdoor Electrical Connection

The general guidelines for the electrical and communication cables to the outdoor unit are the same for each system. However, the actual connections on the terminal block will differ. Refer to each figure for the model you are installing for the correct wiring of each terminal block.

WARNING

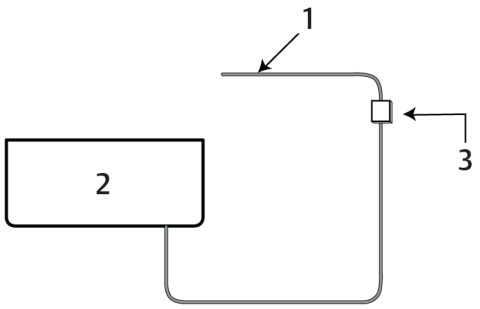
Arc flash and electric shock hazard. Can cause serious injury or death. Open all local and remote electric power disconnect switches, verify with a voltmeter that power is off and wear personal protective equipment per NFPA 70E before working within the electric control enclosure or making any electrical connections or disconnections.

- Follow all safety and warning information in this manual.
- Verify that a circuit breaker or some other emergency-power cutoff device is in place before any power wiring is done to the system.
- Never touch any power lines or live cables before power is cut-off to the system.
- Familiarize yourself with the location of the circuit breaker.

Use a recognized circuit breaker between the power source and the unit. A disconnecting device to adequately disconnect all supply lines must be fitted.

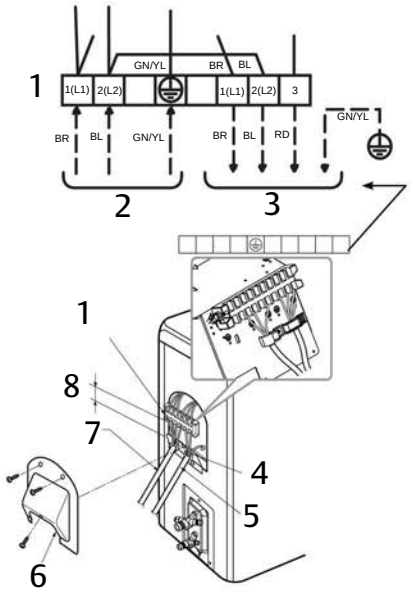
Figure 7-15 shows an example of how a circuit breaker should be wired through the Liebert SRC system.

Figure 7-15 Circuit breaker wiring



No.	Description
1	Main power source
2	Air conditioner
3	Circuit breaker Use a circuit breaker or time-delay fuse.

Figure 7-16 Outdoor-unit terminal-block connections



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