



PRECISION COOLING

LIEBERT DS™

TECHNICAL DATA SUPPLEMENT

*28-105kW
8-30 Tons
Downflow
50Hz*



LIEBERT DS TECHNICAL DATA SUPPLEMENT

LIEBERT DS MODEL NUMBER

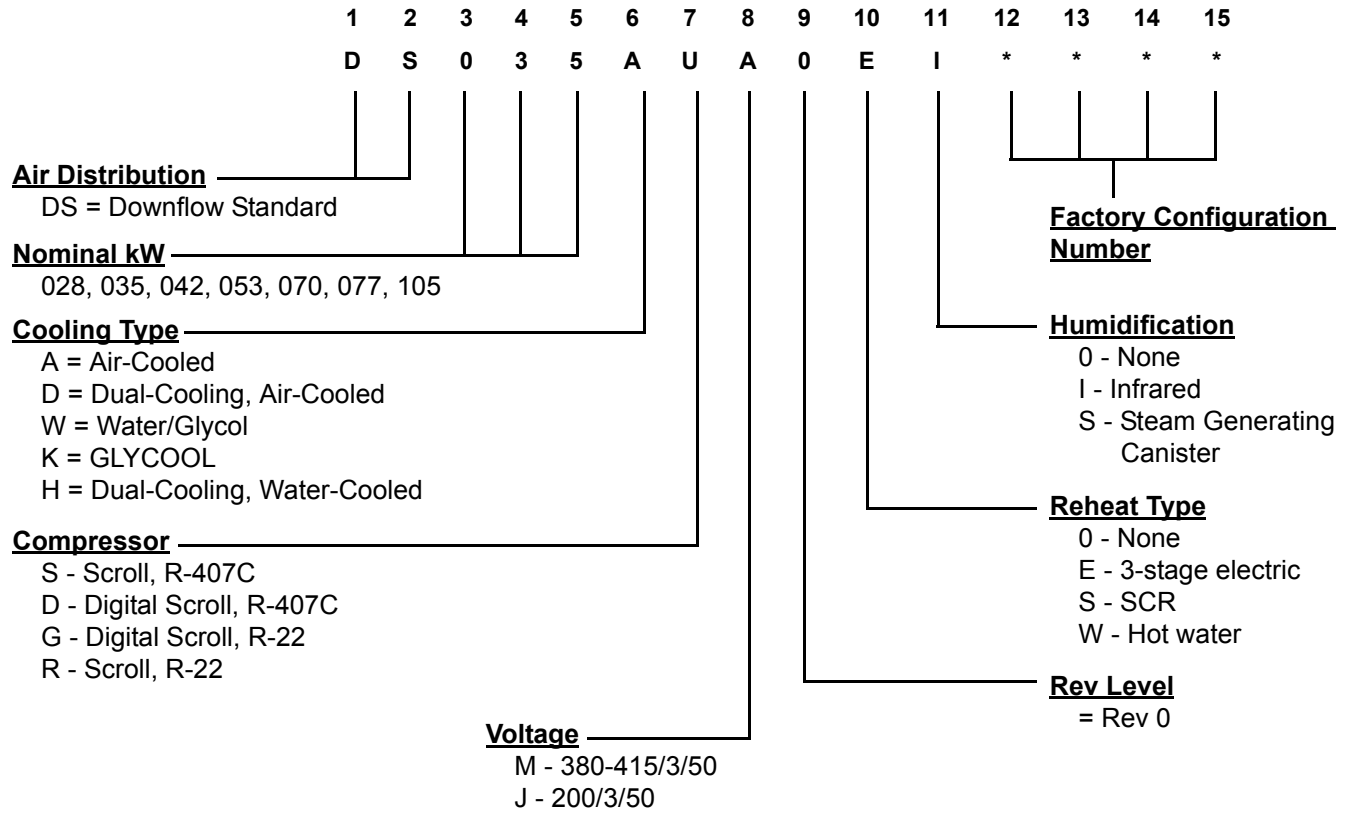


Table 1 Air-cooled capacity data, R-407C refrigerant

Model Size	028	035	042	053	070	105
SCROLL COMPRESSOR						
Net Capacity Data kW (BTUH), Standard Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total kW (BTUH)	31.0 (105,800)	35.0 (119,400)	37.2 (126,900)	57.3 (195,400)	62.3 (212,500)	87.8 (299,500)
Sensible kW (BTUH)	25.8 (88,200)	30.4 (103,700)	33.9 (115,600)	47.1 (160,600)	53.0 (180,800)	75.0 (256,100)
22.2°C DB, 15.5°C WB (72°F DB, 60°F WB) 50% RH						
Total kW (BTUH)	29.5 (100,800)	33.3 (113,700)	35.5 (121,100)	55.0 (187,700)	59.9 (204,500)	83.6 (285,400)
Sensible kW (BTUH)	25.3 (86,200)	29.7 (101,200)	33.1 (112,900)	46.2 (157,700)	52.0 (177,500)	73.3 (250,200)
22.2°C DB, 14.8°C WB (72°F DB, 58.6°F WB) 45% RH						
Total kW (BTUH)	28.7 (98,100)	32.4 (110,500)	34.9 (119,100)	53.8 (183,500)	57.8 (197,200)	80.4 (274,500)
Sensible kW (BTUH)	26.9 (91,900)	32.4 (110,500)	34.9 (119,100)	49.4 (168,600)	57.8 (197,200)	80.4 (274,500)
Net Capacity Data kW (BTUH), Optional Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total kW (BTUH)	30.9 (105,500)	34.1 (116,300)	36.2 (123,400)	56.6 (193,300)	61.2 (208,800)	N/A
Sensible kW (BTUH)	28.8 (98,200)	34.1 (116,300)	36.2 (123,400)	50.7 (173,200)	55.6 (189,700)	N/A
22.2°C DB, 15.5°C WB (72°F DB, 60°F WB) 50% RH						
Total kW (BTUH)	29.2 (99,600)	32.5 (111,000)	34.7 (118,400)	54.4 (185,600)	58.8 (200,700)	N/A
Sensible kW (BTUH)	29.2 (99,600)	32.5 (111,000)	34.7 (118,400)	49.7 (169,600)	54.4 (185,700)	N/A
22.2°C DB, 14.8°C WB (72°F DB, 58.6°F WB) 45% RH						
Total kW (BTUH)	29.2 (99,600)	32.5 (111,000)	34.7 (118,400)	53.2 (181,600)	57.5 (196,400)	N/A
Sensible kW (BTUH)	29.2 (99,600)	32.5 (111,000)	34.7 (118,400)	53.2 (181,600)	57.5 (196,400)	N/A

Note: All capacities are nominal values; actual performance will be ±5%.

Table 2 Air-cooled capacity data, R-22 refrigerant

Model Size	028	035	042	053	070	105
SCROLL COMPRESSOR						
Net Capacity Data kW (BTUH), Standard Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total kW (BTUH)	29.9 (102,100)	33.7 (115,000)	37.8 (129,100)	57.6 (196,600)	64.7 (220,900)	86.5 (295,100)
Sensible kW (BTUH)	26.1 (89,100)	30.4 (103,800)	34.5 (117,800)	48.0 (163,900)	54.5 (186,000)	74.9 (255,700)
22.2°C DB, 15.5°C WB (72°F DB, 60°F WB) 50% RH						
Total kW (BTUH)	28.7 (98,100)	32.4 (110,600)	36.3 (123,800)	55.2 (188,300)	62.2 (212,200)	82.5 (281,500)
Sensible kW (BTUH)	25.6 (87,300)	29.8 (101,700)	33.8 (115,200)	47.1 (160,600)	53.5 (182,500)	73.2 (249,900)
22.2°C DB, 14.8°C WB (72°F DB, 58.6°F WB) 45% RH						
Total kW (BTUH)	28.0 (95,600)	31.8 (108,700)	35.8 (122,100)	53.9 (184,000)	60.8 (207,400)	80.3 (274,000)
Sensible kW (BTUH)	28.0 (95,600)	31.8 (108,700)	35.8 (122,100)	50.3 (171,700)	57.3 (195,700)	80.3 (274,000)
Net Capacity Data kW (BTUH), Optional Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total kW (BTUH)	29.6 (101,000)	33.0 (112,600)	37.0 (126,300)	57.0 (194,400)	63.8 (217,700)	N/A
Sensible kW (BTUH)	29.6 (101,000)	33.0 (112,600)	37.0 (126,300)	51.4 (175,500)	56.9 (194,100)	N/A
22.2°C DB, 15.5°C WB (72°F DB, 60°F WB) 50% RH						
Total kW (BTUH)	28.5 (97,400)	31.8 (108,500)	35.6 (121,500)	54.7 (186,600)	61.1 (208,600)	N/A
Sensible kW (BTUH)	28.5 (97,400)	31.8 (108,500)	35.6 (121,500)	50.3 (171,800)	55.6 (189,900)	N/A
22.2°C DB, 14.8°C WB (72°F DB, 58.6°F WB) 45% RH						
Total kW (BTUH)	28.5 (97,400)	31.8 (108,500)	35.6 (121,500)	53.8 (183,600)	60.0 (204,800)	N/A
Sensible kW (BTUH)	28.5 (97,400)	31.8 (108,500)	35.6 (121,500)	53.8 (183,600)	60.0 (204,800)	N/A

Note: Capacities are factory-certified to be within ±5%, based on ASHRAE 127 test standard.

Table 3 Water-cooled capacity data, R-407C refrigerant

Model Size	028	035	042	053	070	105
COMPRESSOR TYPE	DIGITAL SCROLL				STANDARD SCROLL	
Net Capacity Data kW (BTUH), Standard Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total kW (BTUH)	32.8 (111,900)	37.9 (129,400)	41.4 (141,200)	61.7 (210,700)	71.5 (244,100)	87.8 (299,500)
Sensible kW (BTUH)	26.6 (90,700)	31.5 (107,600)	35.5 (121,300)	48.9 (166,900)	56.7 (193,600)	75.0 (256,100)
22.2°C DB, 15.5°C WB (72°F DB, 60°F WB) 50% RH						
Total kW (BTUH)	31.3 (106,900)	36.2 (123,500)	39.5 (134,700)	59.2 (202,200)	68.1 (232,300)	83.6 (285,400)
Sensible kW (BTUH)	26.0 (88,800)	30.9 (105,300)	34.7 (118,500)	48.0 (163,900)	55.5 (189,300)	73.3 (250,200)
22.2°C DB, 14.8°C WB (72°F DB, 58.6°F WB) 45% RH						
Total kW (BTUH)	30.4 (103,900)	35.1 (119,800)	38.1 (130,100)	57.8 (197,200)	66.2 (226,000)	80.4 (274,500)
Sensible kW (BTUH)	27.8 (94,900)	32.9 (112,400)	38.1 (130,100)	51.2 (174,600)	59.1 (201,800)	80.4 (274,500)
Net Capacity Data kW (BTUH), Optional Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total kW (BTUH)	32.9 (112,200)	37.4 (127,500)	40.8 (139,100)	61.2 (208,800)	70.6 (240,900)	N/A
Sensible kW (BTUH)	29.5 (100,800)	34.0 (115,900)	36.6 (124,800)	52.6 (179,400)	59.3 (202,300)	N/A
22.2°C DB, 15.5°C WB (72°F DB, 60°F WB) 50% RH						
Total kW (BTUH)	31.2 (106,500)	35.5 (121,100)	38.9 (132,800)	58.7 (200,300)	67.2 (229,400)	N/A
Sensible kW (BTUH)	28.8 (98,200)	33.1 (112,900)	35.7 (121,900)	51.5 (175,700)	56.2 (191,700)	N/A
22.2°C DB, 14.8°C WB (72°F DB, 58.6°F WB) 45% RH						
Total kW (BTUH)	30.7 (104,700)	34.9 (119,100)	38.0 (129,700)	56.8 (193,900)	64.3 (219,300)	N/A
Sensible kW (BTUH)	30.7 (104,700)	34.9 (119,100)	38.0 (129,700)	56.8 (193,900)	64.3 (219,300)	N/A

Note: All capacities are nominal values; actual performance will be ±5%.

Table 4 Water-cooled capacity data, R-22 refrigerant

Model Size	028	035	042	053	070	105
COMPRESSOR TYPE	DIGITAL SCROLL				STANDARD SCROLL	
Net Capacity Data kW (BTUH), Standard Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total kW (BTUH)	32.3 (110,100)	37.4 (127,500)	40.9 (139,600)	63.0 (215,000)	70.2 (239,600)	87.2 (295,100)
Sensible kW (BTUH)	27.0 (92,300)	31.9 (108,800)	35.7 (121,900)	50.2 (171,400)	56.7 (193,600)	74.9 (255,700)
22.2°C DB, 15.5°C WB (72°F DB, 60°F WB) 50% RH						
Total kW (BTUH)	31.1 (106,000)	35.8 (122,300)	39.1 (133,300)	60.4 (206,100)	67.2 (229,400)	82.5 (281,500)
Sensible kW (BTUH)	26.6 (90,700)	31.2 (106,600)	34.9 (119,200)	49.3 (168,300)	55.6 (189,800)	73.2 (249,900)
22.2°C DB, 14.8°C WB (72°F DB, 58.6°F WB) 45% RH						
Total kW (BTUH)	30.3 (103,500)	34.7 (118,300)	38.1 (129,900)	59.0 (201,500)	65.8 (224,500)	80.3 (274,000)
Sensible kW (BTUH)	28.4 (96,800)	34.7 (118,300)	38.1 (129,900)	52.6 (179,400)	59.5 (203,100)	80.3 (274,000)
Net Capacity Data kW (BTUH), Optional Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total kW (BTUH)	32.3 (110,100)	36.6 (124,900)	40.4 (137,800)	63.0 (214,900)	69.4 (236,900)	N/A
Sensible kW (BTUH)	29.9 (101,900)	34.0 (116,200)	36.7 (125,200)	53.8 (183,600)	59.1 (201,700)	N/A
22.2°C DB, 15.5°C WB (72°F DB, 60°F WB) 50% RH						
Total kW (BTUH)	31.1 (106,000)	35.3 (120,500)	38.6 (131,700)	60.3 (205,800)	66.4 (226,600)	N/A
Sensible kW (BTUH)	29.2 (99,800)	33.3 (113,800)	35.8 (122,300)	52.7 (179,800)	57.8 (197,400)	N/A
22.2°C DB, 14.8°C WB (72°F DB, 58.6°F WB) 45% RH						
Total kW (BTUH)	30.6 (104,500)	34.9 (119,200)	38.0 (129,800)	58.3 (199,000)	64.3 (219,500)	N/A
Sensible kW (BTUH)	30.6 (104,500)	34.9 (119,200)	38.0 (129,800)	58.3 (199,000)	64.3 (219,500)	N/A

Note: Capacities are factory-certified to be within ±5%, based on ASHRAE 127 test standard.

Table 5 Glycol-cooled capacity data, R-407C refrigerant

Model Size	028	035	042	053	070	105
SCROLL COMPRESSOR						
Net Capacity Data kW (BTUH), Standard Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total kW (BTUH)	28.2 (96,200)	32.1 (109,700)	34.1 (116,500)	54.4 (185,600)	59.8 (204,000)	75.0 (255,900)
Sensible kW (BTUH)	24.7 (84,300)	29.2 (99,800)	34.1 (116,500)	45.9 (156,700)	52.0 (177,400)	70.0 (239,000)
22.2°C DB, 15.5°C WB (72°F DB, 60°F WB) 50% RH						
Total kW (BTUH)	27.2 (92,700)	30.7 (104,700)	32.7 (111,700)	52.4 (179,000)	57.6 (196,600)	71.0 (242,200)
Sensible kW (BTUH)	24.3 (82,800)	28.6 (97,500)	32.7 (111,700)	45.1 (154,000)	51.0 (174,200)	71.0 (242,200)
22.2°C DB, 14.8°C WB (72°F DB, 58.6°F WB) 45% RH						
Total kW (BTUH)	26.6 (90,700)	30.2 (103,200)	32.8 (111,800)	51.2 (174,700)	55.8 (190,600)	71.0 (242,200)
Sensible kW (BTUH)	26.6 (90,700)	30.2 (103,200)	32.8 (111,800)	48.3 (164,800)	55.8 (190,600)	71.0 (242,200)
Net Capacity Data kW (BTUH), Optional Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total kW (BTUH)	28.3 (96,600)	31.6 (107,800)	33.9 (115,600)	53.6 (183,100)	58.5 (199,500)	N/A
Sensible kW (BTUH)	28.3 (96,600)	31.6 (107,800)	33.9 (115,600)	49.6 (169,200)	54.5 (186,100)	N/A
22.2°C DB, 15.5°C WB (72°F DB, 60°F WB) 50% RH						
Total kW (BTUH)	27.1 (92,400)	30.1 (102,800)	32.4 (110,600)	51.5 (175,800)	55.5 (189,300)	N/A
Sensible kW (BTUH)	27.1 (92,400)	30.1 (102,800)	32.4 (110,600)	48.5 (165,600)	55.5 (189,300)	N/A
22.2°C DB, 14.8°C WB (72°F DB, 58.6°F WB) 45% RH						
Total kW (BTUH)	27.1 (92,500)	30.1 (102,800)	32.4 (110,700)	50.9 (173,600)	55.5 (189,300)	N/A
Sensible kW (BTUH)	27.1 (92,500)	30.1 (102,800)	32.4 (110,700)	50.9 (173,600)	55.5 (189,300)	N/A

Note: All capacities are nominal values; actual performance will be ±5%.

Table 6 Glycol-cooled capacity data, R-22 refrigerant

Model Size	028	035	042	053	070	105
SCROLL COMPRESSOR						
Net Capacity Data kW (BTUH), Standard Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total kW (BTUH)	28.5 (97,300)	32.4 (110,600)	34.8 (118,800)	55.4 (189,100)	61.0 (208,100)	75.8 (258,600)
Sensible kW (BTUH)	25.5 (87,100)	29.9 (102,100)	34.8 (118,800)	47.1 (160,800)	53.0 (180,900)	70.7 (241,400)
22.2°C DB, 15.5°C WB (72°F DB, 60°F WB) 50% RH						
Total kW (BTUH)	27.5 (93,900)	31.3 (106,800)	33.5 (114,500)	53.2 (181,500)	58.6 (199,900)	72.3 (246,600)
Sensible kW (BTUH)	25.1 (85,600)	29.4 (100,200)	33.5 (114,500)	46.2 (157,700)	51.9 (177,300)	72.3 (246,600)
22.2°C DB, 14.8°C WB (72°F DB, 58.6°F WB) 45% RH						
Total kW (BTUH)	26.9 (91,900)	30.8 (105,200)	33.6 (114,600)	51.4 (175,400)	57.1 (194,900)	72.3 (246,600)
Sensible kW (BTUH)	26.9 (91,900)	30.8 (105,200)	33.6 (114,600)	51.4 (175,400)	57.1 (194,900)	72.3 (246,600)
Net Capacity Data kW (BTUH), Optional Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.5°F WB) 50% RH						
Total kW (BTUH)	28.4 (96,800)	31.8 (108,400)	34.5 (117,800)	54.6 (186,500)	59.7 (203,600)	N/A
Sensible kW (BTUH)	28.4 (96,800)	31.8 (108,400)	34.5 (117,800)	50.5 (172,400)	55.3 (188,600)	N/A
22.2°C DB, 15.5°C WB (72°F DB, 60°F WB) 50% RH						
Total kW (BTUH)	27.3 (93,200)	30.7 (104,700)	33.3 (113,600)	52.6 (179,600)	57.3 (195,700)	N/A
Sensible kW (BTUH)	27.3 (93,200)	30.7 (104,700)	33.3 (113,600)	49.5 (168,900)	54.1 (184,600)	N/A
22.2°C DB, 14.8°C WB (72°F DB, 58.6°F WB) 45% RH						
Total kW (BTUH)	27.3 (93,300)	30.7 (104,700)	33.3 (113,600)	52.0 (177,500)	56.8 (194,000)	N/A
Sensible kW (BTUH)	27.3 (93,300)	30.7 (104,700)	33.3 (113,600)	52.0 (177,500)	56.8 (194,000)	N/A

Note: Capacities are factory-certified to be within ±5%, based on ASHRAE 127 test standard.

Table 7 Physical data

Model Size	028	035	042	053	070	105
EVAPORATOR COIL- A-Frame - Copper Tube/Aluminum Fin						
Face Area - sq. m (sq. ft.)	1.6 (17.1)	1.6 (17.1)	1.6 (17.1)	2.3 (24.7)	2.3 (24.7)	3.0 (32.3)
Rows of Coil	3	3	3	3	3	3
Face Velocity - m/s (FPM) - STD Air Vol.	1.3 (251.0)	1.6 (316.0)	1.9 (380.0)	1.6 (319.8)	1.9 (384.6)	2.3 (453.6)
FAN SECTION - Downflow models - Fixed Pitch, Two Belts						
Standard Air Volume - CMH (CFM)	7,476 (4,400)	9,345 (5,500)	11,213 (6,600)	13,593 (8,000)	16,311 (9,600)	25,062 (14,200)
Standard Fan Motor kW (hp)	1.5 (2)	2.2 (3)	3.7 (5)	2.2 (3)	3.7 (5)	7.5 (10)
Optional Air Volume - CMH (CFM)	9,345 (5,500)	11,213 (6,600)	12,233 (7,200)	16,311 (9,600)	18,690 (11,000)	N/A
Optional Fan Motor hp	2.2 (3)	3.7 (5)	5.6 (7.5)	3.7 (5)	5.6 (7.5)	N/A
Ext. Static Press - Pa (inches of water)	50 (0.2)	50 (0.2)	50 (0.2)	50 (0.2)	50 (0.2)	50 (0.2)
Quantity of Fans	1	1	1	2	2	3
REHEAT SECTION						
Electric Reheat - Three (3) Stage, Stainless Steel Fin Tubular						
Capacity - kW (BTUH)* - Standard Selection	15.7 (53,600)	17.2 (58,870)	18.7 (63,805)	27.6 (94,199)	29.2 (99,660)	38.8 (132,355)
Capacity - kW (BTUH)* - Optional Selection	10.7 (36,519)	12.2 (41,639)	13.7 (46,758)	17.6 (60,069)	19.4 (66,212)	28.8 (98,295)
Electric Reheat - SCR Control, Stainless Steel Fin Tubular						
Capacity - kW (BTUH)*	15.7 (53,600)	17.2 (58,870)	18.7 (63,805)	27.6 (94,199)	29.2 (99,660)	38.8 (132,355)
HUMIDIFIER SECTION						
Infrared Humidifier						
Capacity, kg/h (lb./hr.)	5 (11)	5 (11)	5 (11)	10 (22)	10 (22)	10 (22)
Steam Generating Humidifier - Water conductivity between 200-500 micromhos is required for ideal operation						
Capacity, kg/h (lb./hr.)	5 (11)	5 (11)	5 (11)	10 (22)	10 (22)	10 (22)
FILTER SECTION - Disposable Type - Nominal Sizes and Quantities						
Downflow Models						
Nominal Size, inches	25x16	25x16	25x16	25x16	25x16	25x16
Quantity	5	5	5	7	7	9
PIPING CONNECTION SIZES - Air-Cooled Liebert DS Unit						
Liquid Line - O.D. Copper (2/unit)	1/2	1/2	1/2	5/8	5/8	5/8
Hot Gas Line - O.D. Copper (2/unit)	5/8	5/8	5/8	7/8	7/8	1-1/8
Infrared Humidifier - O.D. Copper	1/4	1/4	1/4	1/4	1/4	1/4
Condensate Drain - FPT	3/4	3/4	3/4	3/4	3/4	3/4
Condensate Drain w/ Optional Condensate Pump - O.D.	1/2	1/2	1/2	1/2	1/2	1/2
Hot Water Reheat - O.D. Copper	5/8	5/8	5/8	5/8	5/8	1/2

Note: Some options or combinations of options may result in reduced air flow—consult factory for recommendations.

Table 8 Water/glycol requirements

Model Size	028	035	042	053	070	105
WATER-COOLED SYSTEM - Scroll Compressors, based on 75°F/50% room conditions						
THR - kW (BTUH)	39.6 (135,000)	47.1 (160,800)	52.6 (179,500)	80.1 (273,500)	91.6 (312,600)	116.8 (398,700)
23.9°C (75°F) EWT - l/s (GPM)	1.3 (20.4)	1.5 (23.9)	1.7 (26.6)	2.3 (36.3)	2.6 (40.6)	3.2 (51.2)
Pressure Drop - kPa (ft. of water), with bypass	10.7 (3.6)	14.3 (4.8)	17.3 (5.8)	19.7 (6.6)	24.5 (8.2)	39.1 (13.1)
Pressure Drop - kPa (ft. of water), 3-way valve	15.2 (5.1)	20.6 (6.9)	25.4 (8.5)	25.4 (8.5)	31.3 (10.5)	43.9 (14.7)
29.4°C (85°F) EWT - l/s (GPM)	1.9 (29.9)	2.3 (35.8)	2.6 (40.8)	3.4 (54.6)	4.2 (66.1)	5.1 (80.6)
Pressure Drop - kPa (ft. of water), with bypass	21.5 (7.2)	29.8 (10.0)	38.2 (12.8)	42.4 (14.2)	60.3 (20.2)	90.4 (30.3)
Pressure Drop - kPa (ft. of water), 3-way valve	31.6 (10.6)	44.5 (14.9)	57.0 (19.1)	54.9 (18.4)	79.1 (26.5)	102.4 (34.3)
GLYCOL SYSTEM - 40% Ethylene						
THR - kW (BTUH)	40.1 (136,900)	46.9 (160,000)	51.0 (173,900)	76.2 (260,000)	86.1 (294,000)	112.6 (384,400)
Flow Rate - l/s (GPM)	2.1 (34.0)	2.2 (35.0)	2.6 (41.0)	3.3 (52.0)	4.2 (66.0)	5.7 (90.0)
Pressure Drop - kPa (ft. of water), with bypass	34.6 (11.6)	36.7 (12.3)	48.9 (16.4)	47.7 (16.0)	74.3 (24.9)	131.9 (44.2)
Pressure Drop - kPa (ft. of water), 3-way valve	49.5 (16.6)	52.2 (17.5)	70.4 (23.6)	60.6 (20.3)	95.2 (31.9)	148.0 (49.6)
DRYCOOLER - 35°C (95°F) Ambient Selection						
Model	D-174	D-197	D-225	D-350	D-350	D-466
Pressure Drop - kPa (ft. of water)	23.6 (7.9)	24.8 (8.3)	14.6 (4.9)	24.2 (8.1)	20.9 (7.0)	31.6 (10.6)
PIPE SIZE						
Supply - O.D. Copper, mm (in.)	41 (1-5/8")	41 (1-5/8")	41 (1-5/8")	54 (2-1/8")	54 (2-1/8")	54 (2-1/8")
Return - O.D. Copper, mm (in.)	41 (1-5/8")	41 (1-5/8")	41 (1-5/8")	54 (2-1/8")	54 (2-1/8")	54 (2-1/8")

Maximum design water pressure: 1034 kPa (150 psi); 2413 kPa (350 psi) available as an option.

Table 9 Econ-O-Coil capacity data (dual-cool units)

Model Size	028	035	042	053	070	105
WATER (NO GLYCOL)						
Net Capacity Data kW (BTUH), Standard Air Volume and Evaporator Fan Motor						
23.9°C DB, 16.9°C WB (75°F DB, 62.57 WB) 50% RH, 45°F EWT						
Total Capacity, kW (BTUH)	35.7 (121,800)	41.8 (142,800)	46.5 (158,700)	54.2 (184,900)	61.6 (210,400)	86.6 (295,400)
Sensible Capacity, kW (BTUH)	29.8 (101,600)	35.3 (120,400)	39.8 (135,800)	47.9 (163,500)	54.9 (187,500)	78.4 (267,700)
Flow Rate - l/s (GPM)	1.6 (25.6)	1.9 (30.5)	2.2 (34.7)	2.5 (39.6)	2.9 (46.0)	4.2 (65.8)
Pressure Drop for Econ-O-Coil, Valve and Piping (Dual-Cooling Units)						
Pressure Drop - kPa (ft.)	74.4 (10.8)	103.4 (15.0)	130.9 (19.0)	49.6 (7.2)	65.4 (9.5)	107.5 (15.6)
40% ETHYLENE GLYCOL						
23.9°C DB, 16.9°C WB (75°F DB, 62.57 WB) 50% RH, 45°F EWT						
Total Capacity, kW (BTUH)	30.8 (105,200)	33.9 (115,800)	38.8 (132,500)	42.7 (145,800)	52.0 (177,500)	70.3 (239,900)
Sensible Capacity, kW (BTUH)	27.5 (94,000)	31.5 (107,500)	36.1 (123,200)	42.2 (144,100)	50.3 (171,600)	69.4 (236,700)
Flow Rate - l/s (GPM)	2.1 (34.0)	2.2 (35.0)	2.6 (41.0)	3.3 (52.0)	4.2 (66.0)	5.7 (90.0)
Pressure Drop for Free-Cooling Coil, Free-Cooling Valve, Condensers, Regulating Valve and Piping (GLYCOOL System)						
Pressure Drop - kPa (ft.)	271.5 (39.4)	286.6 (41.6)	384.5 (55.8)	236.3 (34.3)	374.8 (54.4)	618.1 (89.7)
Econ-O-Coil, A-Frame - Copper Tube/Aluminum Fin						
Face Area - sq. m (sq. ft.)	1.6 (17.1)	1.6 (17.1)	1.6 (17.1)	2.3 (24.7)	2.3 (24.7)	3.0 (32.3)
Rows of Coil	3	3	3	3	3	3
Face Velocity - m/s (FPM) - STD Air Vol.	1.3 (251.0)	1.6 (316.0)	1.9 (380.0)	1.2 (324.0)	2.0 (389.0)	2.3 (436.0)
Fan Section - Downflow Models - Fixed Pitch, Two (2) Belt Drive Package						
Standard Air Volume - CMH (CFM)	7,476 (4,400)	9,345 (5,500)	11,213 (6,600)	13,592 (8,000)	16,310 (9,600)	14,200 (____)
Fan Motor kW (hp)	1.5 (2)	2.2 (3)	3.7 (5)	3.7 (5)	5.6 (7.5)	15 (____)
Ext. Static Press - Pa (inches of water)	50 (0.2)	50 (0.2)	50 (0.2)	50 (0.2)	50 (0.2)	50 (0.2)
Quantity of Fans	1	1	1	2	2	3

Note: All capacities are nominal values; actual performance will be ±5%.

ELECTRICAL DATA

Reheat Options			Electric, std kW		None or Hot Water		Electric, std kW		None or Hot Water	
Humidifier Options			Infrared or Steam Generating Canister		Infrared or Steam Generating Canister		None		None	
Model	Motor Hp	Volts	200	380/415	200	380/415	200	380/415	200	380/415
028	2.0 hp	FLA	67.9	35.3	61.4	30	67.9	35.3	48.6	23.6
		WSA	83.1	43.2	66.6	32.5	83.1	43.2	53.8	26.1
028	3.0 hp	FLA	70.5	36.6	64.0	31.3	70.5	36.6	51.2	24.9
		WSA	85.7	44.5	69.2	33.8	85.7	44.5	56.4	27.4
035	3.0 hp	FLA	79.0	40.7	79.0	39.5	78.0	40.7	66.2	33.1
		WSA	95.1	49.7	86.1	43.0	95.1	49.7	73.3	36.6
035	5.0 hp	FLA	85.0	43.7	85.0	42.5	84.0	43.7	72.2	36.1
		WSA	101.1	52.7	92.1	46.0	101.1	52.7	79.3	39.6
042	5.0 hp	FLA	85.0	43.7	85.0	42.5	84	43.7	72.2	36.1
		WSA	101.1	52.7	92.1	46.0	101.1	52.7	79.3	39.6
042	7.5 hp	FLA	92.0	47.2	92.0	46.0	91.0	47.2	79.2	39.6
		WSA	108.1	56.2	99.1	49.5	108.1	56.2	86.3	43.1
053	3.0 hp	FLA	118.0	60.2	118	56.1	117.9	60.2	92.6	43.3
		WSA	144.9	74.0	128.4	60.9	144.9	74.0	103.0	48.1
053	5.0 hp	FLA	124.0	63.2	124.0	59.1	123.9	63.2	98.6	46.3
		WSA	150.9	77.0	134.4	63.9	150.9	77.0	109.0	51.1
070	5.0 hp	FLA	132.6	66.1	132.6	64.9	128.2	66.1	107.2	52.1
		WSA	156.3	80.7	144.0	70.4	156.3	80.7	118.6	57.6
070	7.5 hp	FLA	139.6	69.6	139.6	68.4	135.2	69.6	114.2	55.6
		WSA	163.3	84.2	151.0	73.9	163.3	84.2	125.6	61.1
105	10 hp	FLA	170.2	92.3	170.2	92.3	163.8	90.7	144.8	79.5
		WSA	197.1	109.6	184.5	100.3	197.1	109.6	159.1	87.5
105	15 hp	FLA	185.6	100.0	185.6	100.0	179.2	98.4	160.2	87.2
		WSA	212.5	117.3	199.9	108.0	212.5	117.3	174.5	95.2

Reheat Options			Electric, Downsized kW		Electric, Downsized kW	
Humidifier Options			Infrared or Steam Generating Canister		None	
Model	Motor Hp	Volts	200	380/415	200	380/415
028	2.0 hp	FLA	61.4	30.0	54.8	28
		WSA	66.7	34.1	66.7	34.1
028	3.0 hp	FLA	64.0	31.3	64	31.3
		WSA	69.3	35.4	69.2	33.8
035	3.0 hp	FLA	79.0	39.5	66.2	33.4
		WSA	86.1	43.0	78.7	40.5
035	5.0 hp	FLA	85.0	42.5	72.2	36.4
		WSA	92.1	46.0	84.7	43.5
042	5.0 hp	FLA	85.0	42.5	72.2	36.4
		WSA	92.1	46.0	84.7	43.5
042	7.5 hp	FLA	92.0	46.0	79.2	39.9
		WSA	99.1	49.5	91.7	47.0
053	3.0 hp	FLA	118.0	56.1	92.6	45.8
		WSA	128.4	60.9	111.6	56.0
053	5.0 hp	FLA	124.0	59.1	98.6	48.8
		WSA	134.4	63.9	117.6	59.0
070	5.0 hp	FLA	132.6	64.9	107.2	52.1
		WSA	144.0	70.4	122.9	62.7
070	7.5 hp	FLA	139.6	68.4	114.2	55.6
		WSA	151.0	73.9	129.9	66.2
105	10 hp	FLA	170.2	92.3	144.8	79.5
		WSA	184.5	100.3	168.7	91.6
105	15 hp	FLA	185.6	100.0	160.2	87.2
		WSA	199.9	108.0	184.1	99.3

Notes: 1. Reduced reheat for 028, 035, and 042 models is 10kW. 2. Reduced reheat for 053, 070, and 077 models is 15kW. 3. Consult factory for SCR reheat values. 4. Reduced reheat for 105 kW models is 20kW.

Figure 1 Downflow, air-cooled 28-42kW (8-12 tons) with scroll or digital scroll compressor models

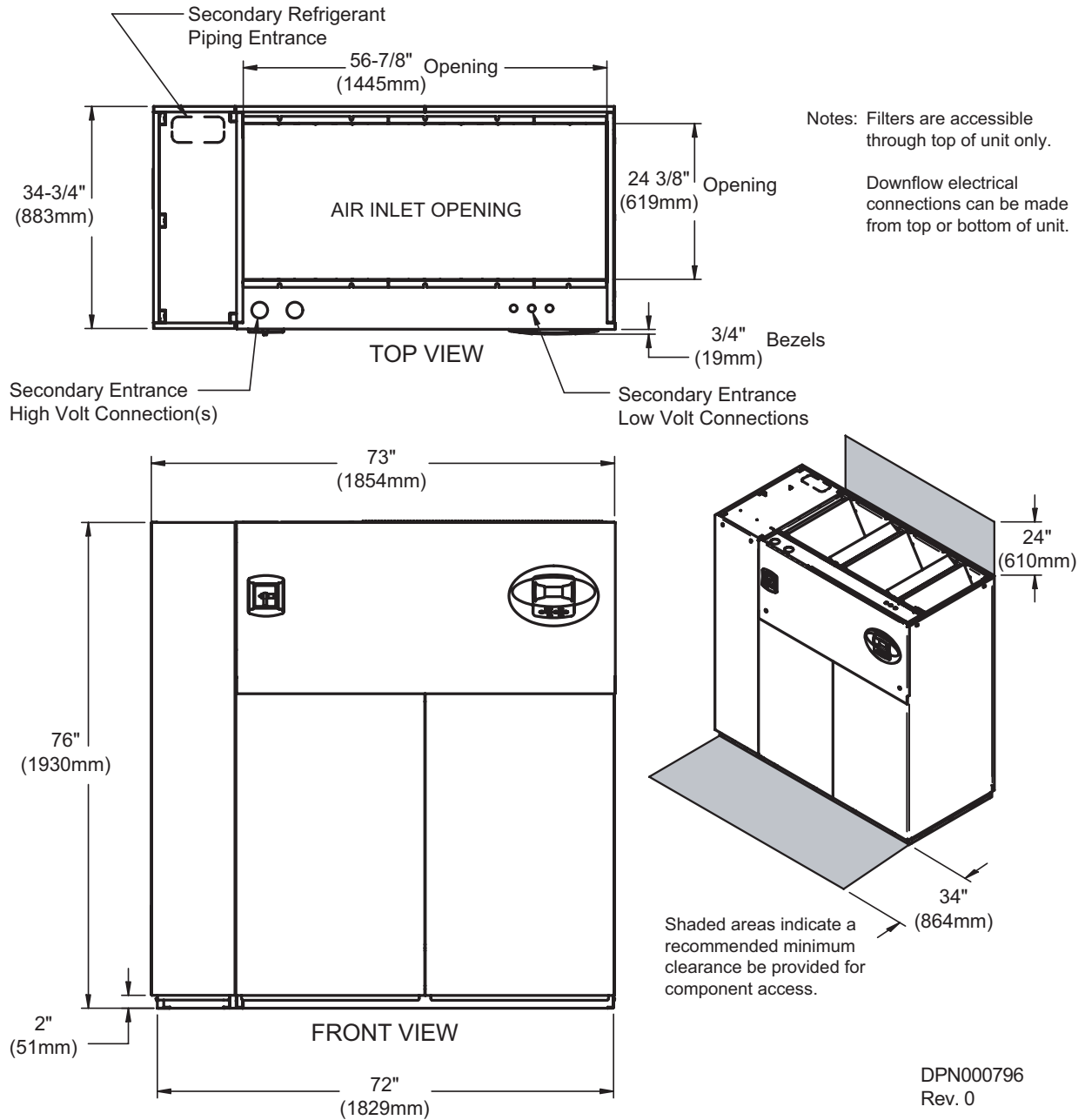


Table 10 Weights - downflow, air-cooled with scroll or digital scroll compressors

Dry Weight, Approximate, lb. (kg)			
Model Size	028	035	042
Air-Cooled	1410 (641)	1440 (655)	1470 (668)
Dual-Cool	1560 (709)	1590 (723)	1620 (736)

Figure 2 Primary connection locations, downflow, air-cooled 28-42kW (8-12 ton) with scroll or digital scroll compressor models

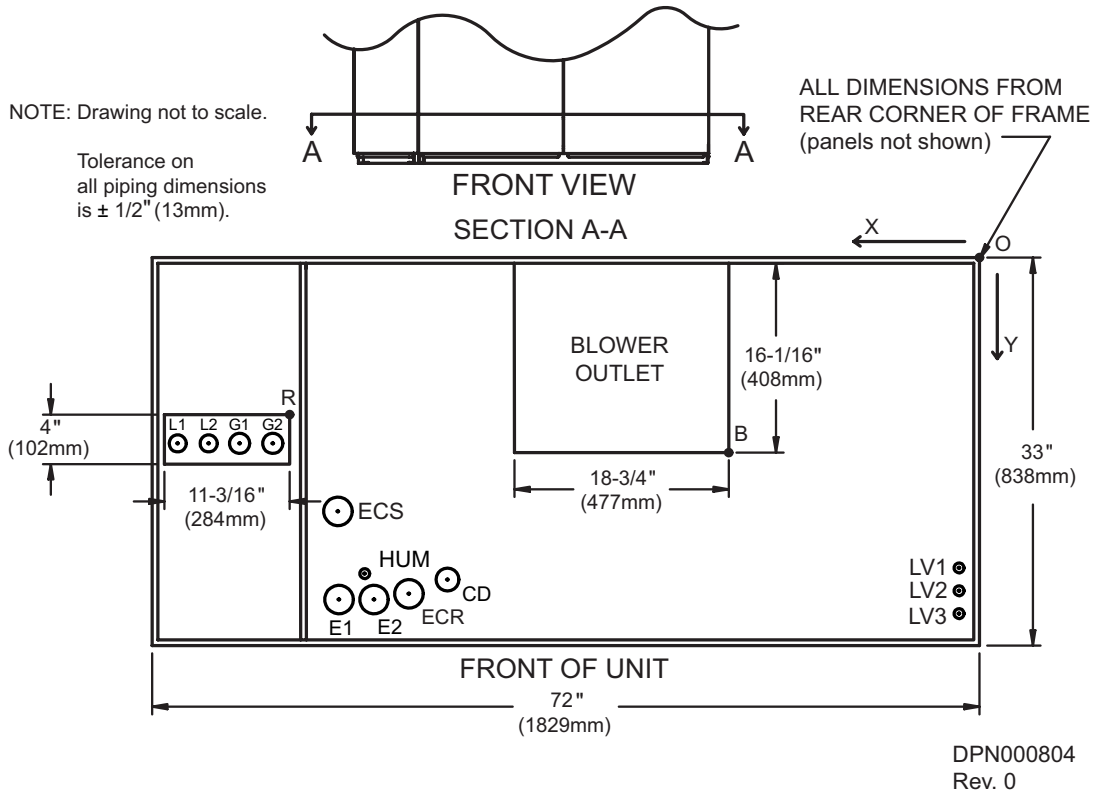


Table 11 Piping data - downflow with scroll or digital scroll compressors

Point	Description	X in. (mm)	Y in. (mm)	Connection Size / Opening in. (mm)
R	Refrigerant Access	59-5/16 (1506)	13-3/4 (349)	11-3/16 x 4 (284 x 102)
L1	Liquid Line System 1	69-15/16 (1776)	15-13/16 (402)	1/2" Cu Sweat
L2	Liquid Line System 2	67-5/8 (1717)	15-13/16 (402)	1/2" Cu Sweat
G1	Hot Gas Discharge 1	65-1/2 (1664)	15-13/16 (402)	5/8" Cu Sweat
G2	Hot Gas Discharge 2	62-7/16 (1586)	15-13/16 (402)	5/8" Cu Sweat
CD	Condensate Drain *	46 (1168)	28-1/2 (724)	3/4" FPT
	W/ Optional Pump	46 (1168)	28-1/2 (724)	1/2" Cu Sweat
HUM	Humidifier Supply Line	53-1/2 (1359)	28 (711)	1/4" Cu Sweat
ECS	Econ-O-Coil Supply	54-7/8 (1394)	21-9/16 (547)	1-5/8" Cu Sweat
ECR	Econ-O-Coil Return	49-3/8 (1254)	29-3/4 (756)	1-5/8" Cu Sweat
HS	Hot Water Reheat Supply	Consult factory		
HR	Hot Water Reheat Return	Consult factory		
E1	Electrical Conn. (High Volt)	55-1/2 (1410)	30-1/4 (768)	2-1/2"
E2	Electrical Conn. (High Volt)	52-7/16 (1332)	30-1/4 (768)	2-1/2"
LV1	Electrical Conn. (Low Volt)	2-1/4 (57)	26 (660)	7/8"
LV2	Electrical Conn. (Low Volt)	2-1/4 (57)	28 (711)	7/8"
LV3	Electrical Conn. (Low Volt)	2-1/4 (57)	30 (762)	7/8"
B	Blower Outlet	21-15/16 (558)	17-1/16 (433)	18-3/4 x 16-1/16 (477 x 434)

* Field pitch Condensate Drain line a minimum of 1/8" (3.2 mm) per foot (305 mm). All units contain a factory-installed condensate trap. Do not trap external to the unit. Drain line may contain boiling water. Select appropriate drain system materials. The drain line must comply with all local codes.

Figure 3 Downflow, water/glycol/GLYCOOL 28-42kW (8-12 tons) - all compressor models

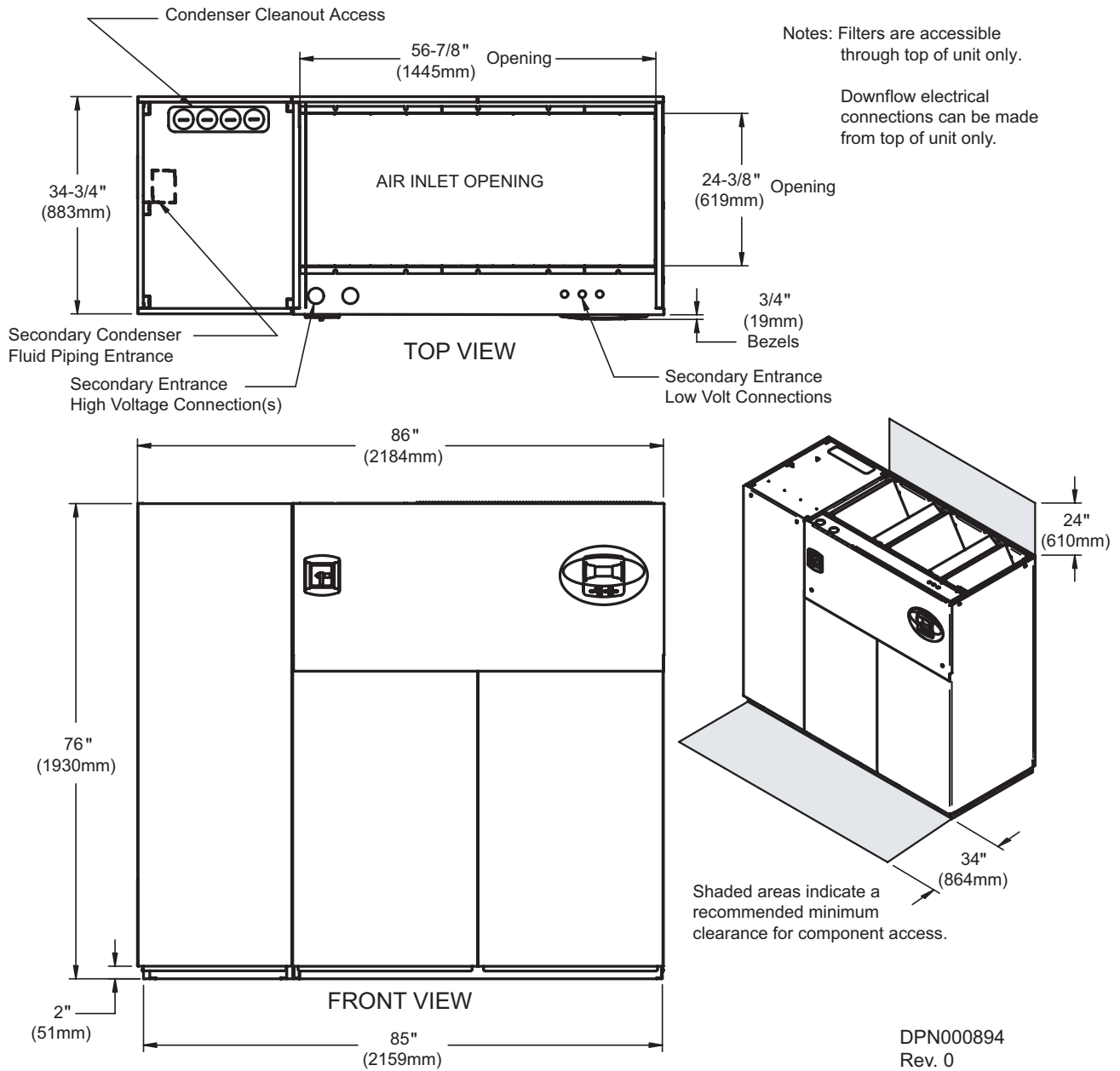


Table 12 Weights - downflow, water/glycol/GLYCOOL, all compressor models

Dry Weight, Approximate, lb. (kg)				
Model Size		028	035	042
Scroll or Digital Scroll Compressor	Water/Glycol	1720 (782)	1750 (795)	1780 (809)
	GLYCOOL/Dual-Cool	1870 (850)	1900 (864)	1930 (877)

Figure 4 Primary connection locations, downflow, water/glycol/GLYCOOL 28-42kW (8-12 tons) - all compressor models

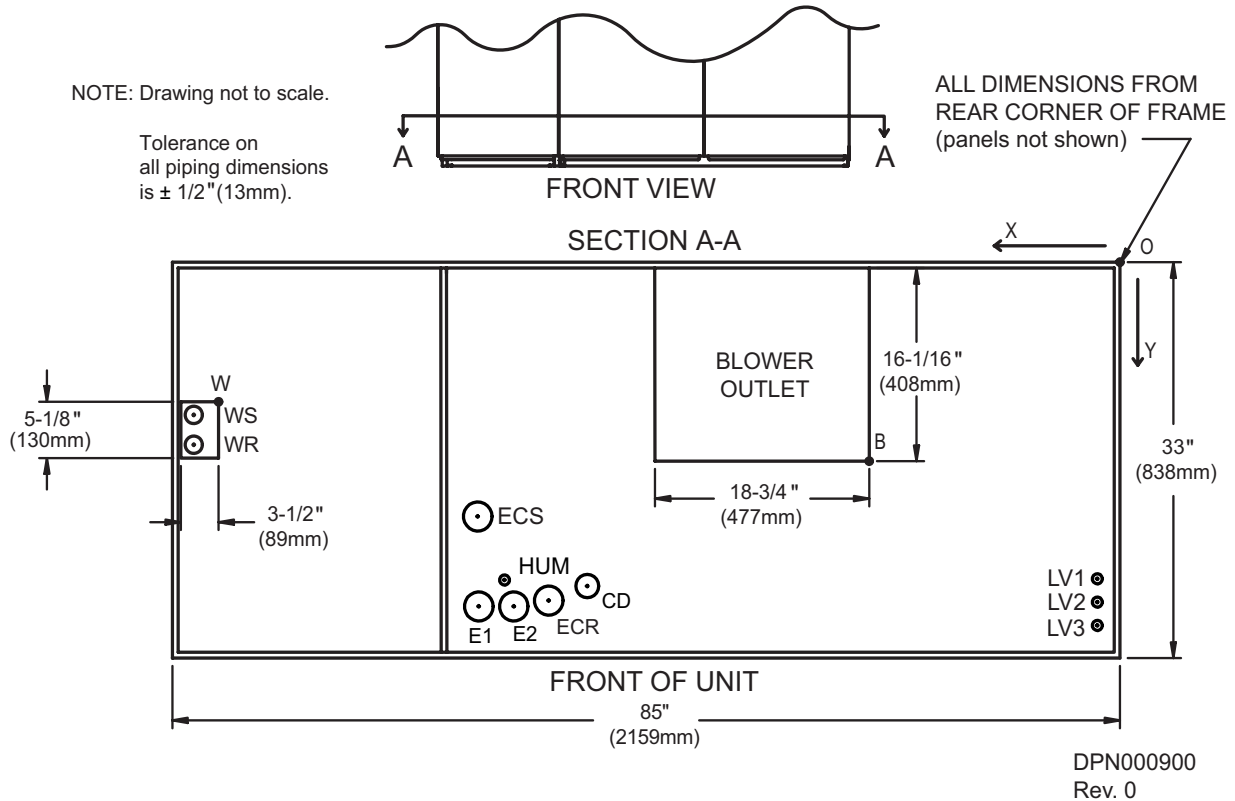


Table 13 Downflow water/glycol/GLYCOOL all compressor models

Point	Description	X in. (mm)	Y in. (mm)	Connection Size / Opening in. (mm)
W	Water/glycol/GLYCOOL Access	79-15/16 (2031)	10-15/16 (278)	3-1/2 x 5-1/8 (89 x 130)
WS	Water/Glycol/GLYCOOL Supply	82-15/16 (2091)	11-15/16 (303)	1-5/8" Cu Sweat
WR	Water/Glycol/GLYCOOL Return	82-15/16 (2091)	15-1/16 (383)	1-5/8" Cu Sweat
CD	Condensate Drain *	46 (1168)	28-1/2 (724)	3/4" FPT
	W/ Optional Pump	46 (1168)	28-1/2 (724)	1/2" Cu Sweat
HUM	Humidifier Supply Line	53-1/2 (1359)	28 (711)	1/4" Cu Sweat
ECS	Econ-O-Coil Supply **	54-7/8 (1394)	21-9/16 (547)	1-5/8" Cu Sweat
ECR	Econ-O-Coil Return **	49-3/8 (1254)	29-3/4 (756)	1-5/8" Cu Sweat
HS	Hot Water Reheat Supply	Consult factory		
HR	Hot Water Reheat Return	Consult factory		
E1	Electrical Conn. (High Volt)	55-1/2 (1410)	30-1/4 (768)	2-1/2"
E2	Electrical Conn. (High Volt)	52-7/16 (1332)	30-1/4 (768)	2-1/2"
LV1	Electrical Conn. (Low Volt)	2-1/4 (57)	26 (660)	7/8"
LV2	Electrical Conn. (Low Volt)	2-1/4 (57)	28 (711)	7/8"
LV3	Electrical Conn. (Low Volt)	2-1/4 (57)	30 (762)	7/8"
B	Blower Outlet	21-15/16 (558)	17-1/16 (433)	18-3/4 x 16-1/16 (477 x 434)

* Field pitch Condensate Drain line a minimum of 1/8" (3.2 mm) per foot (305 mm). All units contain a factory-installed condensate trap. Do not trap external to the unit. Drain line may contain boiling water. Select appropriate drain system materials. The drain line must comply with all local codes.

** Supplied on Dual-Cooling Systems only (4-pipe system).

Figure 5 Downflow, air-cooled 53-77kW (15-22 tons) with scroll or digital scroll compressor models

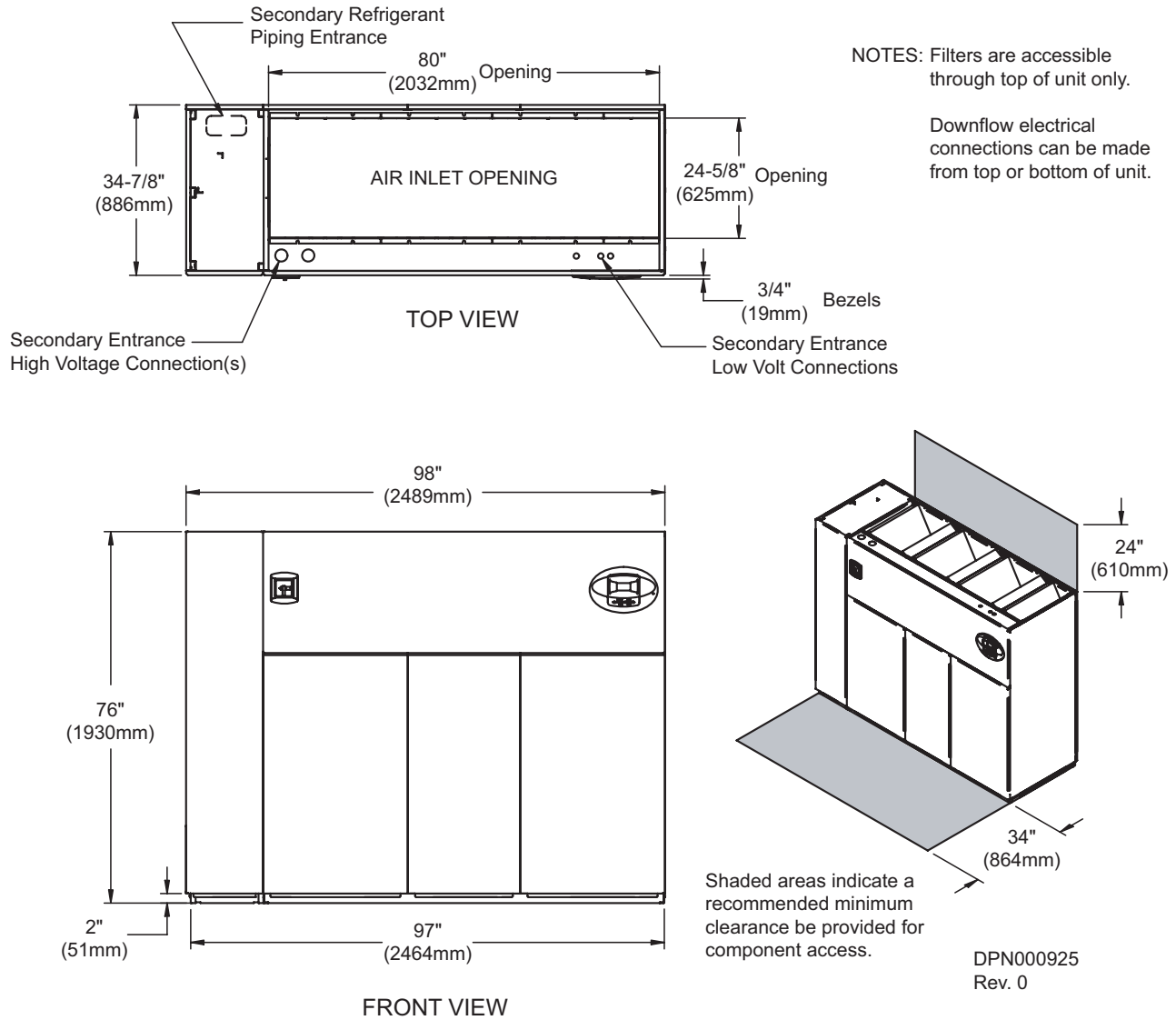


Table 14 Weights - downflow, air-cooled with scroll or digital scroll compressors

Dry Weight, Approximate, lb. (kg)			
Model Size	053	070	077
Air-Cooled	1920 (873)	1970 (896)	2020 (919)
Dual-Cool	2100 (955)	2150 (978)	2200 (1000)

Figure 6 Primary connection locations, downflow, air-cooled 53-77kW (15-22 tons) with scroll or digital scroll compressor models

NOTE: Drawing not to scale.

Tolerance on all piping dimensions is $\pm 1/2"$ (13mm).

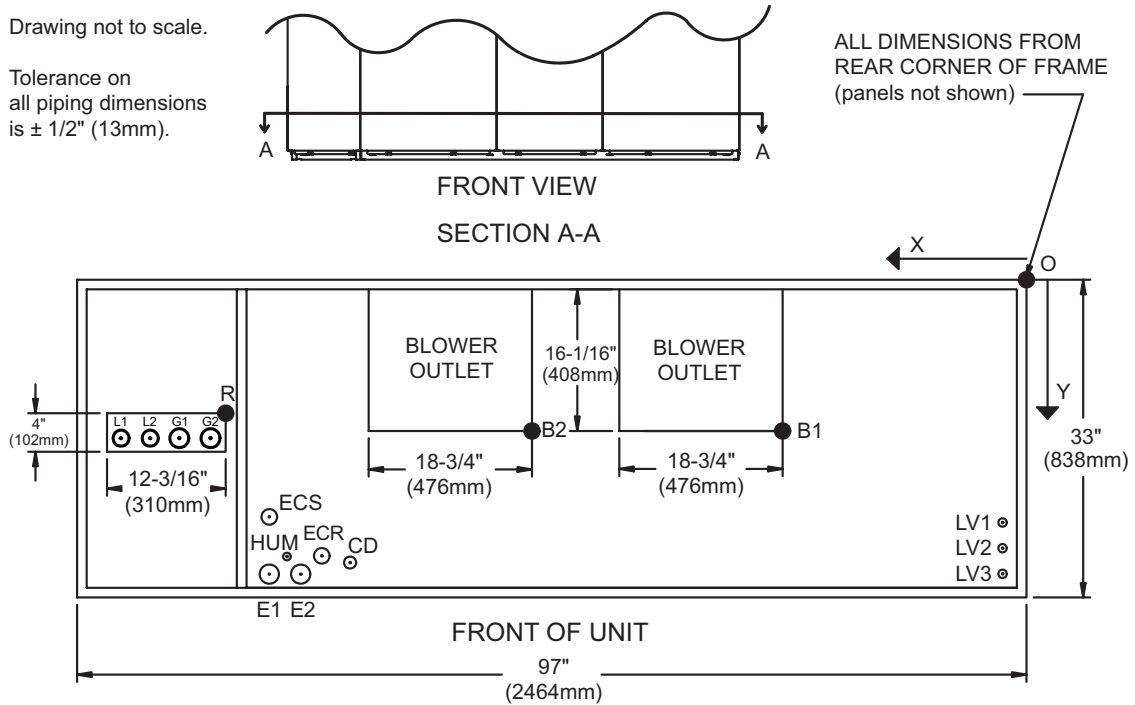


Table 15 Piping data - downflow with scroll or digital scroll compressors

Point	Description	X in. (mm)	Y in. (mm)	Connection Size / Opening in. (mm)
R	Refrigerant Access	81-3/4 (2076)	13-3/4 (349)	12-3/16 x 4 (310 x 102)
L1	Liquid Line System 1	94-11/16 (2405)	15-3/4 (401)	5/8" Cu Sweat
L2	Liquid Line System 2	91-7/8 (2334)	15-3/4 (401)	5/8" Cu Sweat
G1	Hot Gas Discharge 1	88-3/4 (2255)	15-3/8 (391)	1-1/8" Cu Sweat
G2	Hot Gas Discharge 2	85-9/16 (2173)	15-3/8 (391)	1-1/8" Cu Sweat
CD	Condensate Drain *	68-1/4 (1734)	29 (737)	3/4" FPT
	W/ Optional Pump	68-1/4 (1734)	29 (737)	1/2" Cu Sweat
HUM	Humidifier Supply Line	75-1/2 (1918)	28 (711)	1/4" Cu Sweat
ECS**	Econ-O-Coil Supply	77-5/8 (1972)	23-5/8 (600)	2-1/8" Cu Sweat
ECR**	Econ-O-Coil Return	70-15/16 (1802)	23-5/8 (600)	2-1/8" Cu Sweat
HS	Hot Water Reheat Supply	Consult factory		
HR	Hot Water Reheat Return	Consult factory		
E1	Electrical Conn. (High Volt)	77-5/8 (1972)	30-1/8 (765)	2-1/2"
E2	Electrical Conn. (High Volt)	74-3/8 (1889)	30-1/8 (765)	2-1/2"
LV1	Electrical Conn. (Low Volt)	2-1/4 (57)	26 (660)	7/8"
LV2	Electrical Conn. (Low Volt)	2-1/4 (57)	28 (711)	7/8"
LV3	Electrical Conn. (Low Volt)	2-1/4 (57)	30 (762)	7/8"
B1	Blower Outlet	26-1/16 (662)	23-5/8 (600)	18-3/4 x 16-1/16 (477 x 434)
B2	Blower Outlet	48-7/8 (1241)	23-5/8 (600)	18-3/4 x 16-1/16 (477 x 434)

* Field pitch Condensate Drain line a minimum of 1/8" (3.2 mm) per foot (305 mm). All units contain a factory-installed condensate trap. Do not trap external to the unit. Drain line may contain boiling water. Select appropriate drain system materials. The drain line must comply with all local codes.

** Supplied on Dual-Cooling Systems only (4-pipe system).

Figure 7 Downflow, water/glycol/GLYCOOL 53-77kW (15-22 tons) - all compressor models

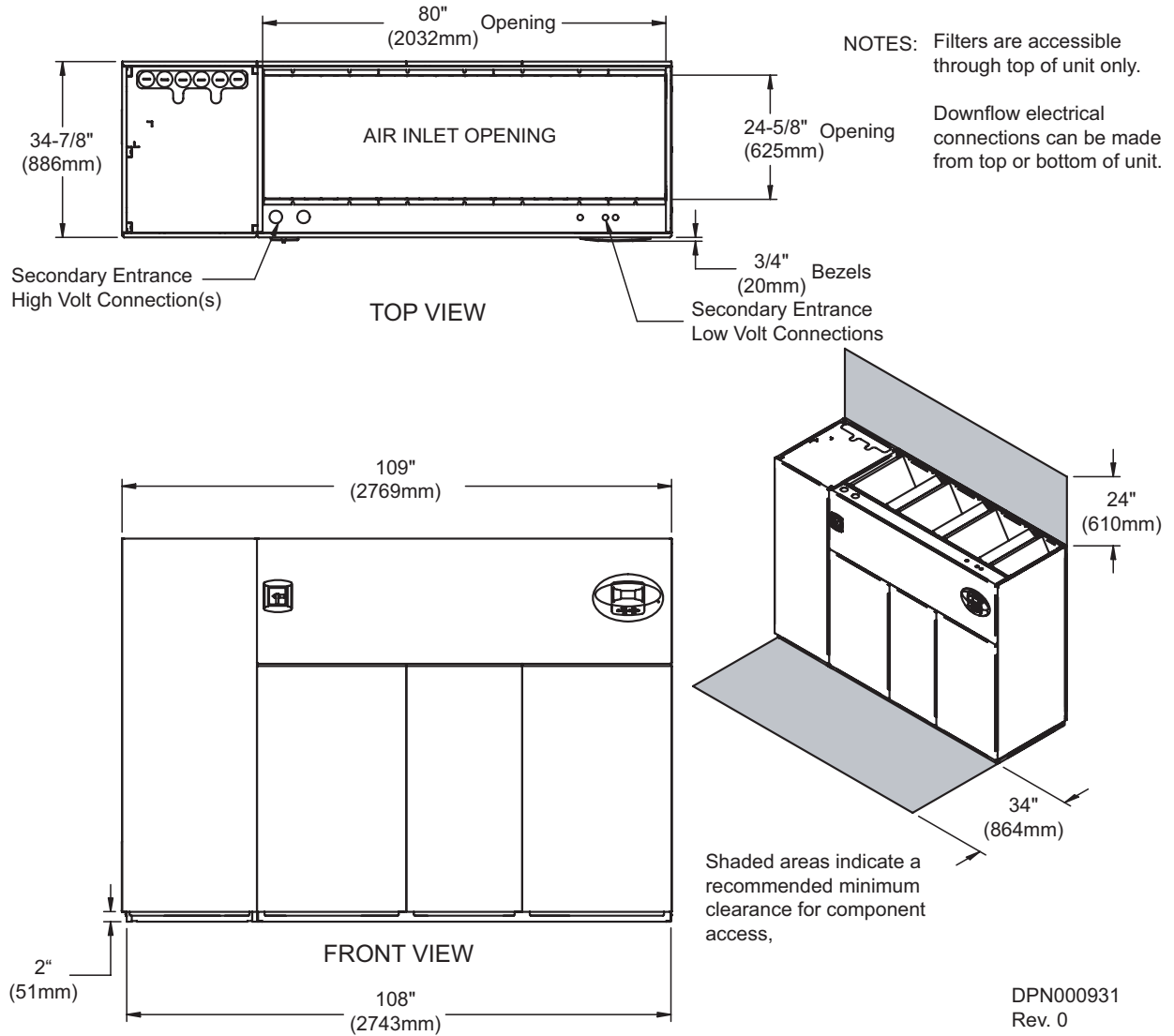


Table 16 Weights - downflow, water/glycol/GLYCOOL, all compressor models

Dry Weight, Approximate, lb. (kg)				
Model Size		053	070	077
Scroll or Digital Scroll Compressor	Water/Glycol	2220 (1010)	2270 (1032)	2320 (1055)
	GLYCOOL/Dual-Cool	2400 (1091)	2450 (1114)	2500 (1137)

Figure 8 Primary connection locations, downflow water/glycol/GLYCOOL 53-77kW (15-22 tons) - all compressor models

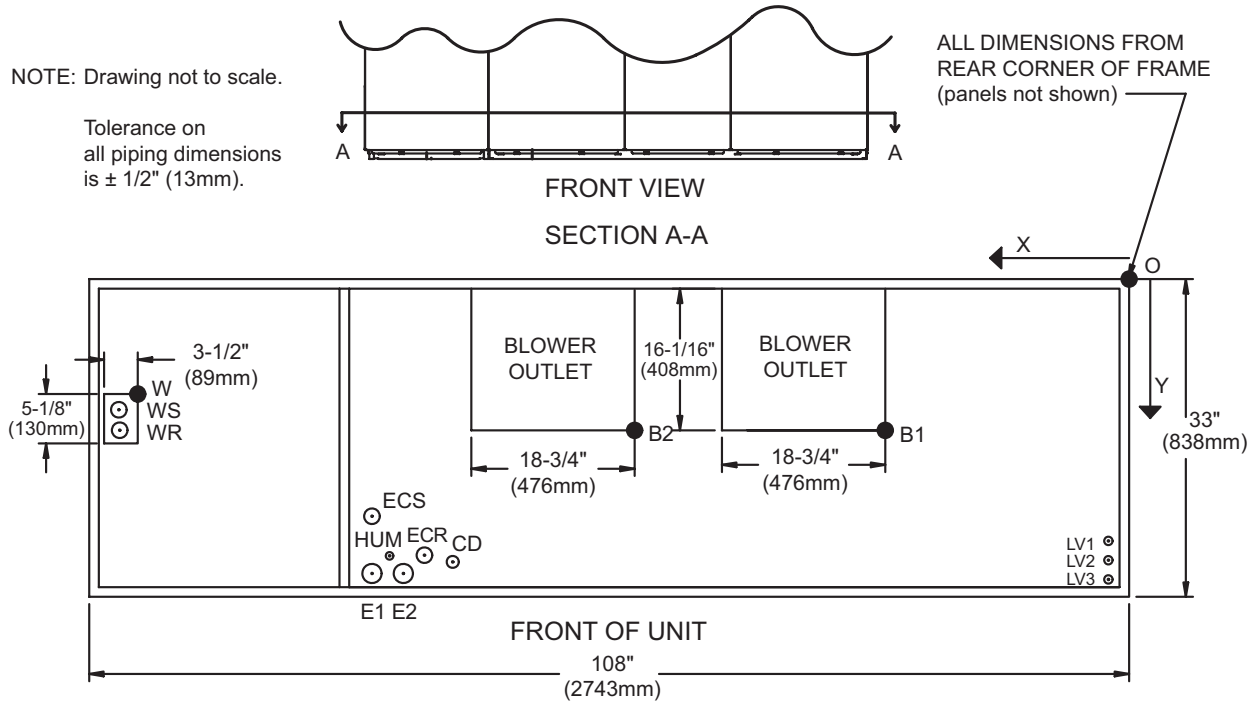


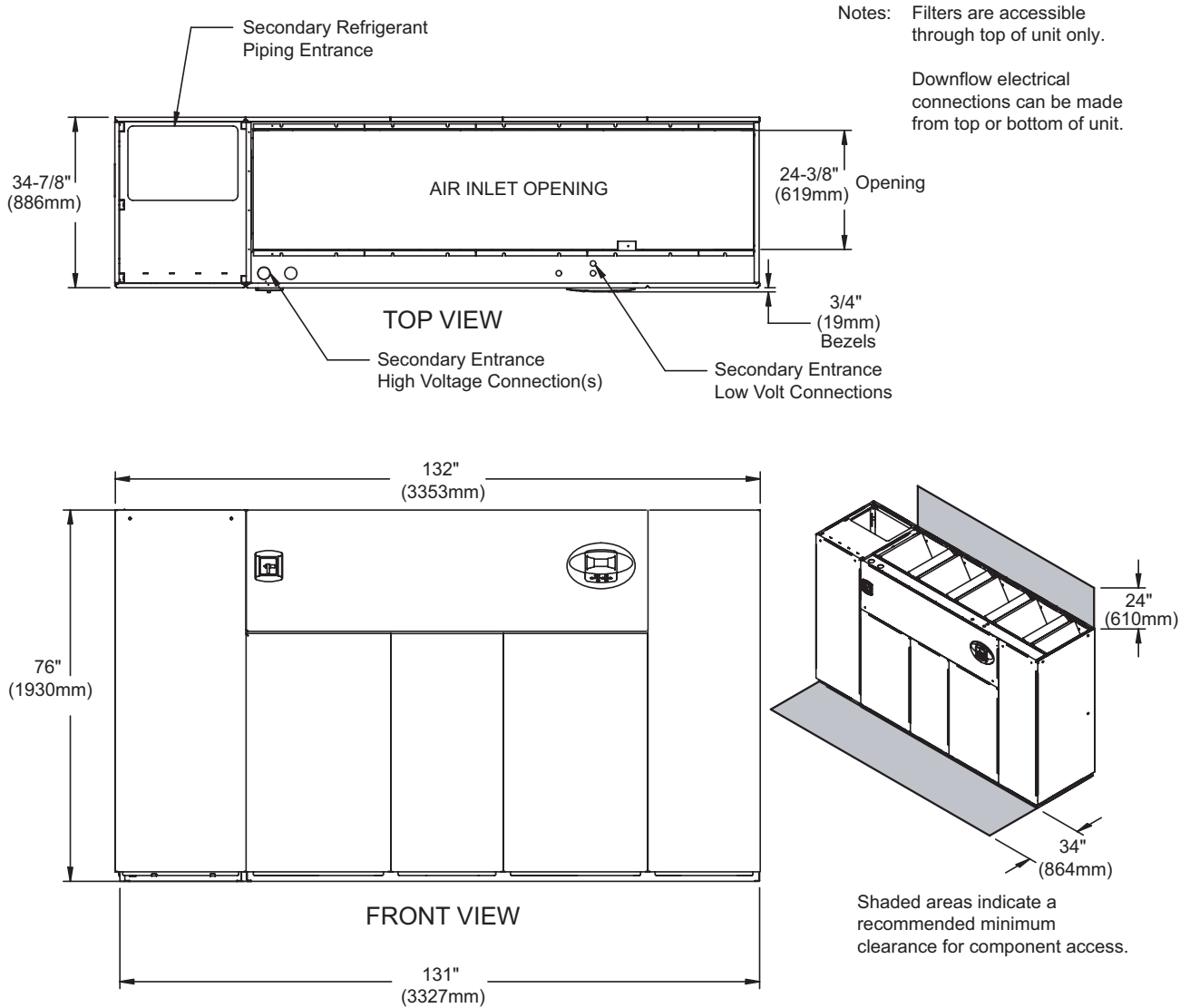
Table 17 Downflow water/glycol/GLYCOOL all compressor models

Point	Description	X in. (mm)	Y in. (mm)	Connection Size / Opening in. (mm)
W	Water/glycol/GLYCOOL Access	101-15/16 (2590)	10-15/16 (278)	3-1/2 x 5-1/8 (89 x 130)
WS	Water/Glycol/GLYCOOL Supply	103-11/16 (2634)	12-1/4 (311)	2-1/8" Cu Sweat
WR	Water/Glycol/GLYCOOL Return	103-11/16 (2634)	14-3/4 (375)	2-1/8" Cu Sweat
CD	Condensate Drain *	68-1/4 (1734)	29 (737)	3/4" Cu Sweat
	W/ Optional Pump	68-1/4 (1734)	29 (737)	1/2" Cu Sweat
HUM	Humidifier Supply Line	75-1/2 (1918)	28 (711)	1/4" Cu Sweat
ECS**	Econ-O-Coil Supply	77-5/8 (1972)	23-5/8 (600)	2-1/8" Cu Sweat
ECR**	Econ-O-Coil Return	70-15/16 (1802)	23-5/8 (600)	2-1/8" Cu Sweat
HS	Hot Water Reheat Supply	Consult factory		
HR	Hot Water Reheat Return	Consult factory		
E1	Electrical Conn. (High Volt)	77-5/8 (1972)	30-1/8 (765)	2-1/2"
E2	Electrical Conn. (High Volt)	74-3/8 (1889)	30-1/8 (765)	2-1/2"
LV1	Electrical Conn. (Low Volt)	2-1/4 (57)	26 (660)	7/8"
LV2	Electrical Conn. (Low Volt)	2-1/4 (57)	28 (711)	7/8"
LV3	Electrical Conn. (Low Volt)	2-1/4 (57)	30 (762)	7/8"
B1	Blower Outlet	26-1/16 (662)	23-5/8 (600)	18-3/4 x 16-1/16 (477 x 434)
B2	Blower Outlet	48-7/8 (1241)	23-5/8 (600)	18-3/4 x 16-1/16 (477 x 434)

* Field pitch Condensate Drain line a minimum of 1/8" (3.2 mm) per foot (305 mm). All units contain a factory-installed condensate trap. Do not trap external to the unit. Drain line may contain boiling water. Select appropriate drain system materials. The drain line must comply with all local codes.

** Supplied on Dual-Cooling Systems only (4-pipe system).

Figure 9 Downflow, air-cooled 105kW (30 tons) - all compressor models



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Table 18 Weights - downflow, air-cooled, all compressor models

Dry Weight, Approximate, lb. (kg)		
Model Size		105
Semi-Hermetic Compressors	Air-Cooled	3040 (1382)
	Dual-Cool	3380 (1536)
Scroll Compressors	Air-Cooled	2920 (1327)
	Dual-Cool	3260 (1482)

Figure 10 Primary connection locations, downflow, air-cooled 105kW (30 tons) - all compressor models

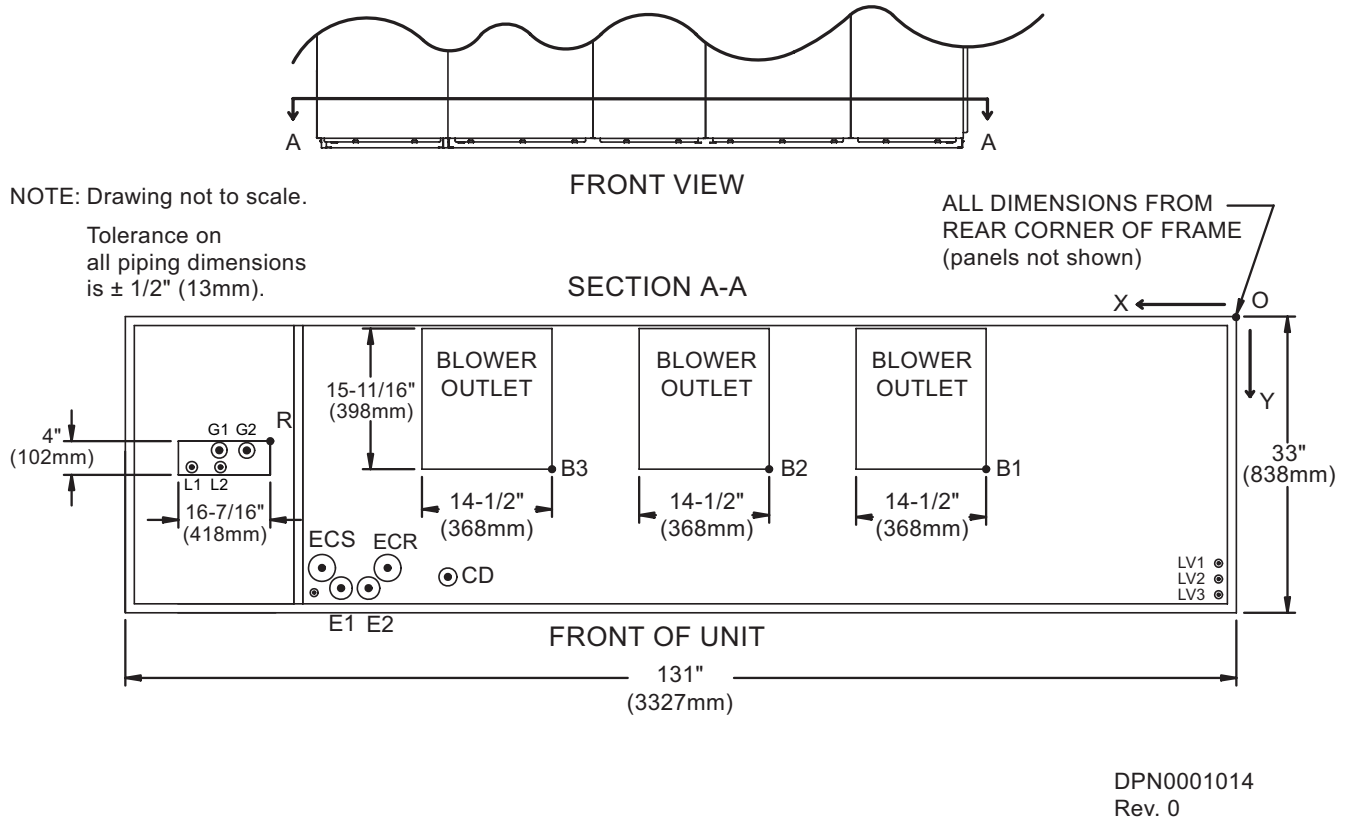


Table 19 Downflow air-cooled all compressor models

Point	Description	X in. (mm)	Y in. (mm)	Connection Size / Opening in. (mm)
R	Refrigerant Access	109 (2769)	14-3/4 (375)	16-7/16" x 4 (418 x 102)
L1	Liquid Line System 1	121-3/4 (3092)	15-3/4 (400)	5/8" Cu Sweat
L2	Liquid Line System 2	118-1/8 (3000)	15-3/4 (400)	5/8" Cu Sweat
G1	Hot Gas Discharge 1	118-1/4 (3004)	13-1/4 (337)	1-1/8" Cu Sweat
G2	Hot Gas Discharge 2	115-5/8 (2937)	13-1/4 (337)	1-1/8" Cu Sweat
CD	Condensate Drain *	87-13/16 (2231)	29 (737)	3/4" FPT
	W/ Optional Pump	87-13/16 (2231)	29 (737)	1/2" Cu Sweat
HUM	Humidifier Supply Line	102-3/4 (2610)	30-3/4 (781)	1/4" Cu Sweat
ECS	Econ-O-Coil Supply **	101-7/8 (2588)	28 (711)	2-5/8" Cu Sweat
ECR	Econ-O-Coil Return **	94-9/16 (2402)	28 (711)	2-5/8" Cu Sweat
HS	Hot Water Reheat Supply	Consult factory		
HR	Hot Water Reheat Return	Consult factory		
E1	Electrical Conn. (High Volt)	99-3/4 (2534)	30-1/4 (768)	2-1/2"
E2	Electrical Conn. (High Volt)	96-11/16 (2456)	30-1/4 (768)	2-1/2"
LV1	Electrical Conn. (Low Volt)	2 (51)	27-1/4 (698)	7/8"
LV2	Electrical Conn. (Low Volt)	2 (51)	29-1/4 (742)	7/8"
LV3	Electrical Conn. (Low Volt)	2 (57)	31 (787)	7/8"
B1	Blower Outlet	27-7/8 (708)	17 (432)	14-1/2 x 15-11/16 (368 x 398)
B2	Blower Outlet	52-1/16 (1322)	17 (432)	14-1/2 x 15-11/16 (368 x 398)
B3	Blower Outlet	76-1/4 (1937)	17 (432)	14-1/2 x 15-11/16 (368 x 398)

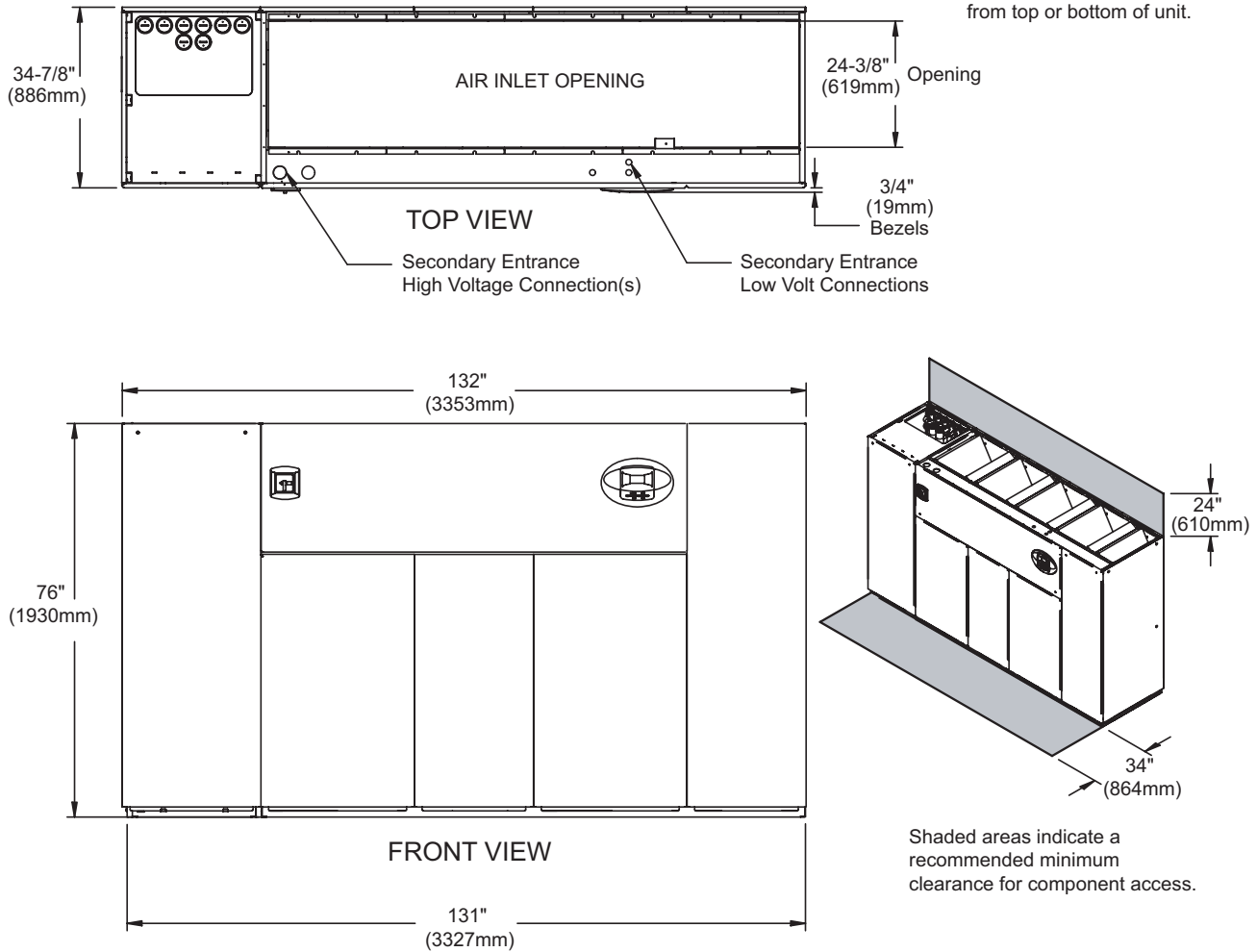
* Field pitch Condensate Drain line a minimum of 1/8" (3.2 mm) per foot (305 mm). All units contain a factory-installed condensate trap. Do not trap external to the unit. Drain line may contain boiling water. Select appropriate drain system materials. The drain line must comply with all local codes.

** Supplied on Dual-Cooling Systems only (4-pipe system).

Figure 11 Downflow, water/glycol/GLYCOOL 105kW (30 tons) - all compressor models

Notes: Filters are accessible through top of unit only.

Downflow electrical connections can be made from top or bottom of unit.

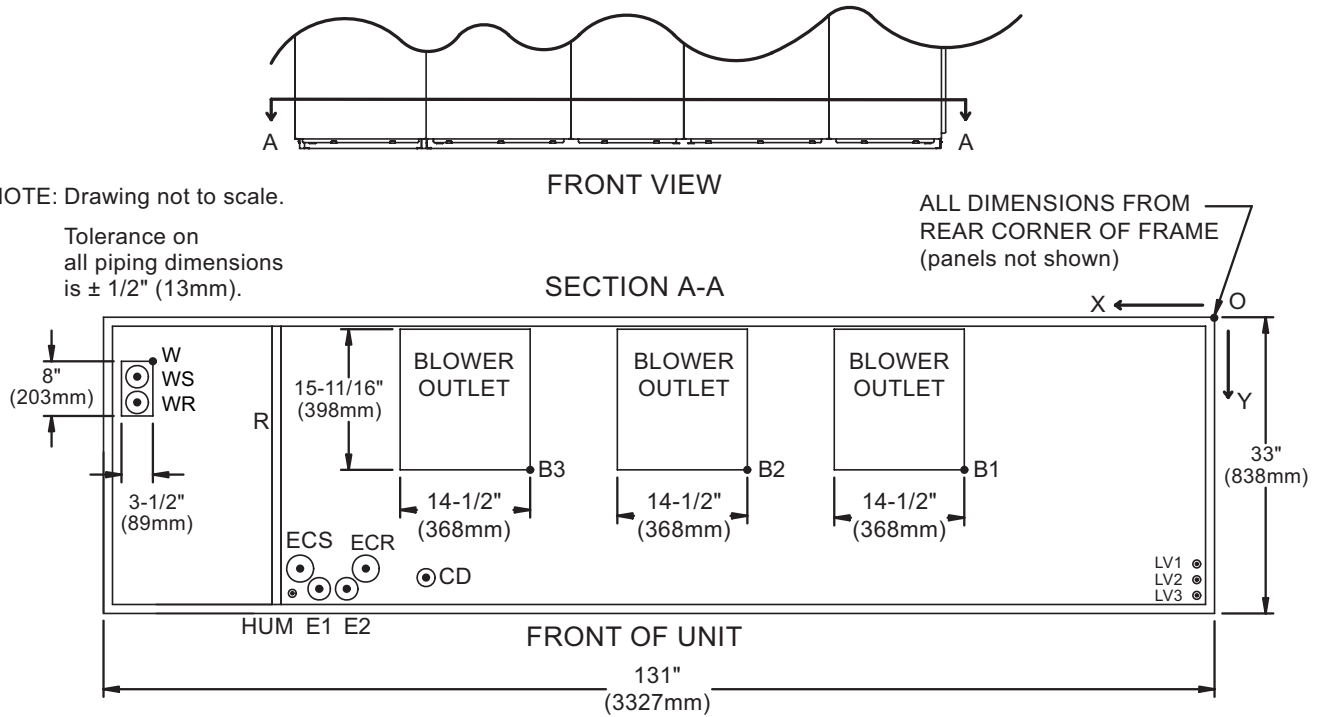


DPN0001013
Rev. 0

Table 20 Weights - downflow, water/glycol/GLYCOOL, all compressor models

Dry Weight, Approximate, lb. (kg)		
Model Size		105
Semi-Hermetic Compressors	Water/Glycol	3410 (1550)
	GLYCOOL/Dual-Cool	3750 (1705)
Scroll Compressors	Water/Glycol	3290 (1495)
	GLYCOOL/Dual-Cool	3630 (1650)

Figure 12 Primary connection locations, downflow, water/glycol/GLYCOOL 105kW (30 tons) - all compressor models



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Table 21 Downflow water/glycol/GLYCOOL all compressor models

Point	Description	X in. (mm)	Y in. (mm)	Connection Size / Opening in. (mm)
W	Water/Glycol/GLYCOOL Access	125-15/16 (3199)	7-15/16 (202)	3-1/2 x 8 (89 x 203)
WS	Water/Glycol/GLYCOOL Supply	127-7/8 (3248)	9-1/16 (230)	2-1/8" Cu Sweat
WR	Water/Glycol/GLYCOOL Return	127-7/8 (3248)	12-1/4 (311)	2-1/8" Cu Sweat
CD	Condensate Drain *	87-13/16 (2231)	29 (737)	3/4" FPT
	W/ Optional Pump	87-13/16 (2231)	29 (737)	1/2" Cu Sweat
HUM	Humidifier Supply Line	102-3/4 (2610)	30-3/4 (781)	1/4" Cu Sweat
ECS	Econ-O-Coil Supply **	101-7/8 (2588)	28 (711)	2-5/8" Cu Sweat
ECR	Econ-O-Coil Return **	94-9/16 (2402)	28 (711)	2-5/8" Cu Sweat
HS	Hot Water Reheat Supply	Consult factory		
HR	Hot Water Reheat Return	Consult factory		
E1	Electrical Conn. (High Volt)	99-3/4 (2534)	30-1/4 (768)	2-1/2"
E2	Electrical Conn. (High Volt)	96-11/16 (2456)	30-1/4 (768)	2-1/2"
LV1	Electrical Conn. (Low Volt)	2 (51)	27-1/4 (698)	7/8"
LV2	Electrical Conn. (Low Volt)	2 (51)	29-1/4 (742)	7/8"
LV3	Electrical Conn. (Low Volt)	2 (57)	31 (787)	7/8"
B1	Blower Outlet	27-7/8 (708)	17 (432)	14-1/2 x 15-11/16 (368 x 398)
B2	Blower Outlet	52-1/16 (1322)	17 (432)	14-1/2 x 15-11/16 (368 x 398)
B3	Blower Outlet	76-1/4 (1937)	17 (432)	14-1/2 x 15-11/16 (368 x 398)

* Field pitch Condensate Drain line a minimum of 1/8" (3.2 mm) per foot (305 mm). All units contain a factory-installed condensate trap. Do not trap external to the unit. Drain line may contain boiling water. Select appropriate drain system materials. The drain line must comply with all local codes.

** Supplied on Dual-Cooling Systems only (4-pipe system).

Figure 13 Dimensional data, 1-4 fan models

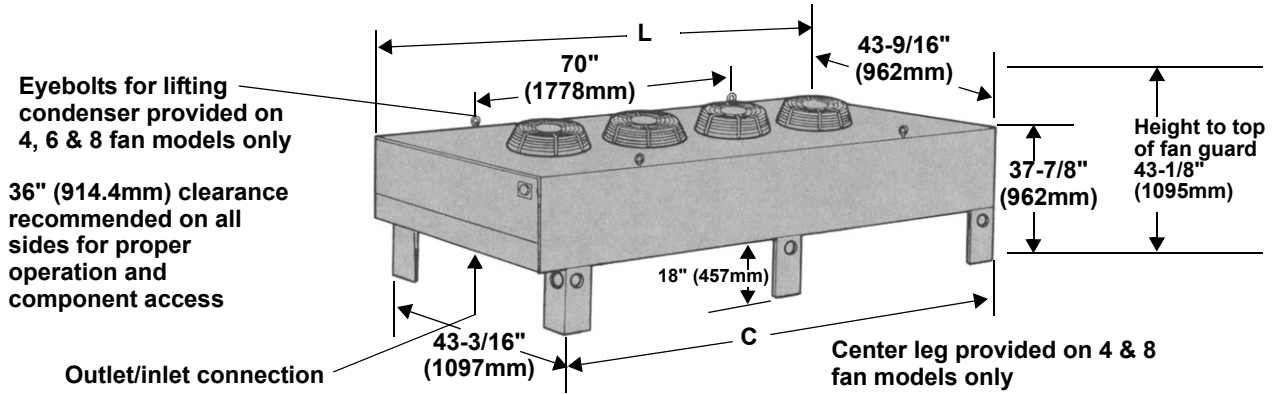


Figure 14 Dimensional data, 6-8 fan models

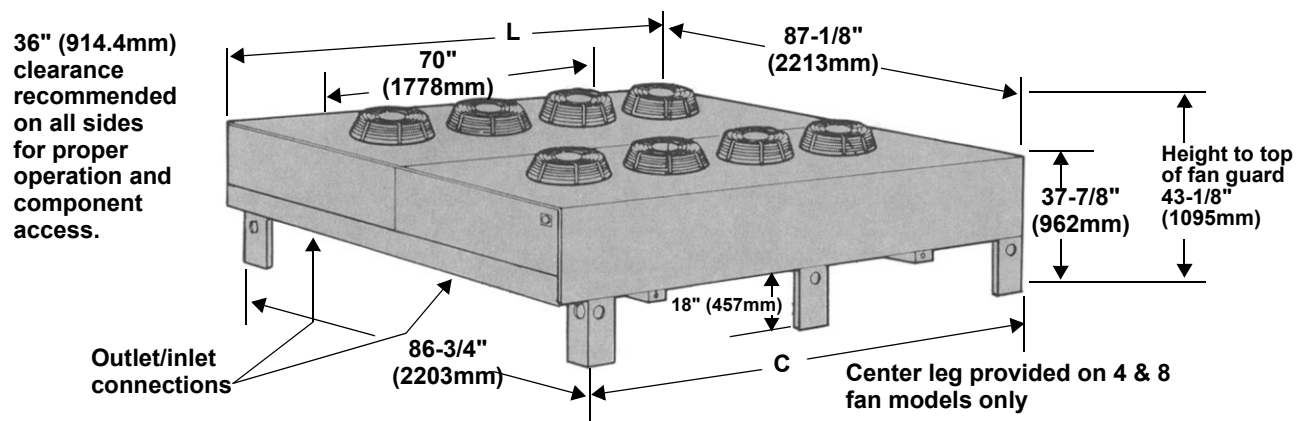


Table 22 Liebert DS air-cooled condenser selection

Refrigerant	Air-Cooled Condenser Selection		Liebert DS Size						
	Condenser Type	Ambient Temperature °F (°C)	028	035	042	053	070	077	105
R-22	Outdoor Condenser	95 (35)	CD*-165	CD*-165	CD*-205	CD*-205	CD*-308	CD*-308	CD*-415
		100 (38)	CD*-165	CD*-205	CD*-205	CD*-308	CD*-415	CD*-415	CD*-510
		105 (41)	CD*-205	CD*-205	CD*-308	CD*-308	CD*-415	CD*-510	CD*-616
	Outdoor Quiet-Line Condenser	95 (35)	CD*-143	CD*-143	CD*-214	CD*-286	CD*-409	CD*-409	CD*-572
		100 (38)	CD*-214	CD*-214	CD*-214	CD*-286	CD*-409	CD*-409	CD*-572
		105 (41)	CD*-214	CD*-286	CD*-286	CD*-409	CD*-477	CD*-572	CD*-572
R-407C	Outdoor Condenser	95 (35)	CD*-205	CD*-205	CD*-205	CD*-251	CD*-308	CD*-308	CD*-415
		100 (38)	CD*-205	CD*-205	CD*-251	CD*-308	CD*-415	CD*-415	CD*-616
		105 (41)	CD*-251	CD*-251	CD*-308	CD*-415	CD*-415	CD*-510	CD*-616
	Outdoor Quiet-Line Condenser	95 (35)	CD*-214	CD*-214	CD*-286	CD*-286	CD*-409	CD*-409	CD*-572
		100 (38)	CD*-214	CD*-214	CD*-286	CD*-409	CD*-477	CD*-572	N/A
		105 (41)	CD*-286	CD*-286	CD*-409	CD*-409	CD*-572	CD*-572	N/A

Table 23 Liebert DS drycooler selection

Drycooler Type	Ambient Temperature °F (°C)	Liebert DS Model						
		028	035	042	053	070	077	105
Outdoor Drycooler	95 (35)	D-174	D-174	D-225-16	D-260	D-310	D-350	D-466
	100 (38)	D-225-16	D-225-16	D-310	D-350	D-419	D-466	D-620-32
	105 (41)	D-310-16	D-350-16	D-419	D-491-32	D-620-32	D-650-40	D-880-52
Outdoor Quiet-Line Drycooler	95 (35)	D-173-16	D-178-16	D-205	DD-248	D-347-32	D-347-32	D-453
	100 (38)	D-205-16	D-205-16	D-347-32	D-347-32	D-453-32	D-453-32	N/A
	105 (41)	D-356-32	D-356-32	D-453-32	D-453-32	D-453-32	N/A	N/A

Table 24 Lieberr condenser dimensions

Condenser Size	Number of Fans	Dimensions, in. (mm)				Net Weight lb. (kg)
		A	B	C	L	
CD*-165	2	82 (2083)	—	84 (2134)	91-1/2 (2324)	425 (193)
CD*-205	2	82 (2083)	—	84 (2134)	91-1/2 (2324)	495 (225)
CD*-251	3	122 (3099)	—	124 (3150)	131-1/2 (3340)	500 (227)
CD*-308	3	122 (3099)	—	124 (3150)	131-1/2 (3340)	670 (305)
CD*-415	4	82 (2083)	80 (2032)	164 (4166)	171-1/2 (4356)	815 (370)
CD*-510	4	82 (2083)	80 (2032)	164 (4166)	171-1/2 (4356)	1188 (540)
CD*-616	6	122 (3099)	—	164 (4166)	171-1/2 (4356)	1380 (627)

Table 25 Lieberr Quiet-Line condenser dimensions

Condenser Size	Number of Fans	Dimensions, in. (mm)				Net Weight lb. (kg)
		A	B	C	L	
CD*-143	2	82 (2083)	—	84 (2134)	91-1/2 (2324)	515 (234)
CD*-214	3	122 (3099)	—	124 (3150)	131-1/2 (3340)	840 (382)
CD*-286	4	82 (2083)	80 (2032)	164 (4166)	171-1/2 (4356)	1105 (502)
CD*-409	6	122 (3099)	—	124 (3150)	131-1/2 (3340)	1380 (627)
CD*-477	6	122 (3099)	—	124 (3150)	131-1/2 (3340)	1580 (718)
CD*-572	8	82 (2083)	80 (2032)	164 (4166)	171-1/2 (4356)	2430 (1104)

Table 26 Lieberr drycooler dimensions

Drycooler Size	Number of Fans	Dimensions, in. (mm)				Net Weight lb. (kg)
		A	B	C	L	
D-174	2	82 (2083)	—	84 (2134)	91-1/2 (2324)	605 (275)
D-225	2	82 (2083)	—	84 (2134)	91-1/2 (2324)	685 (311)
D-260	3	122 (3099)	—	124 (3150)	131-1/2 (3340)	826 (375)
D-310	3	122 (3099)	—	124 (3150)	131-1/2 (3340)	886 (403)
D-350	3	82 (2083)	80 (2032)	164 (4166)	171-1/2 (4356)	946 (430)
D-419	4	82 (2083)	80 (2032)	164 (4166)	171-1/2 (4356)	1120 (509)
D-466	4	82 (2083)	80 (2032)	164 (4166)	171-1/2 (4356)	1150 (523)
D-491	4	82 (2083)	80 (2032)	164 (4166)	171-1/2 (4356)	1200 (545)
D-620	6	122 (3099)	—	124 (3150)	131-1/2 (3340)	1940 (882)
D-650	6	122 (3099)	—	124 (3150)	131-1/2 (3340)	2000 (909)
D-880	8	82 (2083)	80 (2032)	164 (4166)	171-1/2 (4356)	2730 (1241)

Table 27 Lieberr Quiet-Line drycooler dimensions

Drycooler Size	Number of Fans	Dimensions, in. (mm)				Net Weight lb. (kg)
		A	B	C	L	
D-173	3	122 (3099)	—	124 (3150)	131-1/2 (3340)	885 (402)
D-178	3	122 (3099)	—	124 (3150)	131-1/2 (3340)	860 (391)
D-205	4	82 (2083)	80 (2032)	164 (4166)	171-1/2 (4356)	1070 (486)
D-248	4	82 (2083)	80 (2032)	164 (4166)	171-1/2 (4356)	1160 (527)
D-347	6	122 (3099)	—	124 (3150)	131-1/2 (3340)	1780 (809)
D-356	6	122 (3099)	—	124 (3150)	131-1/2 (3340)	1880 (854)
D-453	8	82 (2083)	80 (2032)	164 (4166)	171-1/2 (4356)	2250 (1023)

GUIDE SPECIFICATIONS

1.0 GENERAL

1.1 Summary

These specifications describe requirements for a Mission Critical Cooling system. The system shall be designed to control temperature and humidity conditions in rooms containing electronic equipment, with good insulation and vapor barrier. The manufacturer shall design and furnish all equipment to be fully compatible with heat dissipation requirements of the room.

1.2 Design Requirements

The Mission Critical Cooling system shall be a Liebert self-contained, factory-assembled unit with downflow air delivery. The system shall have a net total cooling capacity of ____ kW (BTUH) with a net sensible cooling capacity of ____ kW (BTUH) based on an entering air temperature of ____ °F (°C) dry bulb and ____ °F (°C) wet bulb. The unit is to be supplied with ____ volt ____ ph ____ Hz electrical service. Net capacities shall include losses due to fan motor heat.

1.3 Submittals

Submittals shall be provided after the agreement of the proposal and shall include: Single-Line Diagrams; Dimensional, Electrical and Capacity Data; Piping and Electrical Connection Drawings.

2.0 PRODUCT

2.1 Frame

The frame shall be MIG welded, formed sheet metal. It shall be protected against corrosion using the auto-phoretic coating process. The frame shall be capable of being separated into three parts in the field to accommodate rigging through small spaces.

2.1.1 Downflow Air Supply

The supply air shall exit from the bottom of the unit, with the air scrolled towards the front of the unit.

2.1.2 Downflow Air Return

The return air shall enter the unit from the top.

2.1.3 Exterior Panels

The exterior panels shall be insulated with a minimum 1 in. (25mm), 1.5 lb. (0.68 kg) density fiber insulation. The main front panel shall have captive 1/4 turn fasteners. The main unit color shall be _____.

2.1.3.1 Double-Skin Panels (Optional)

The exterior panels shall be internally lined with 20 gauge sheetmetal, sandwiching the insulation between the panels, for easy cleaning.

2.2 Filters, Downflow Unit

The filter chamber shall be located within the cabinet, and filters shall be removable from the top of the unit. Filters shall be arranged in a V-bank configuration to minimize air pressure drop.

2.2.1 Filters, 4"

Filters shall be deep pleated 4" filters with an ASHRAE 52.2 MERV8 rating (45% ASHRAE 52.1) or ASHRAE 52.2 MERV11 rating (60-65% ASHRAE 52.1).

2.2.1 Filters, 2" Pre-Filter With 2" Filter

Filters shall be 2" ASHRAE 52.2 MERV7 (40% ASHRAE 52.1) pre-filter, with 2" ASHRAE 52.2 MERV11 (60-65% ASHRAE 52.1) efficiency filter.

2.2.2 Extra Filter Set

____ extra set(s) of filters shall be provided per system.

2.3 Blower Section

The blower section shall be designed for ____ CFM (CMH) at an external static pressure of ____ in. wg. (Pa). The fans shall be the centrifugal type, double width double inlet and shall be statically and dynamically balanced as a completed assembly to a maximum vibration level of two mils in any plane. The shaft shall be heavy duty steel with self-aligning, permanently sealed, pillow block bearings with a minimum L3 life of 200,000 hours. The fans shall draw air through the A-frame coil to ensure even air distribution and maximum coil performance. A static regain duct shall be factory-installed to the bottom of the blower.

2.3.1 Motor

The fan motor shall be ____ hp (kW) at 1750 RPM @60hz (1450 RPM @50hz), mounted to an automatic, spring-tensioning base. The motor shall be removable from the front of the cabinet.

2.3.1.1 Premium Efficiency Motor

The fan motor shall be Open Drip-Proof, Premium efficiency and shall meet NEMA Premium standard. Motor efficiency shall be ____%.

2.3.1.1 TEFC Motor (Optional)

The motor shall be Totally Enclosed Fan Cooled for protection in harsh environments.

2.3.2 Drive Package

The motor sheave and fan pulley shall be double-width fixed pitch. Two belts, sized for 200% of the fan motor horsepower shall be provided with the drive package. An auto-tension system shall provide constant tension on the belts. Belts, shaft, blower bearings, sheave and pulley shall be warranted for five years (parts only).

2.4 Humidifier

A humidifier shall be factory-installed inside the unit. Bypass air slots shall be included to enable moisture to be absorbed into the air stream. The humidifier capacity shall be ___lb./hr (kg/hr). The humidifier shall be removable from the front of the cabinet.

2.4.1 Infrared Humidifier

The humidifier shall be of the infrared type consisting of high intensity quartz lamps mounted above and out of the water supply. The humidifier pan shall be stainless steel and arranged to be removable without disconnecting high voltage electrical connections. The complete humidifier section shall be pre-piped, ready for field connection to water supply. The humidifier shall be equipped with an automatic water supply system and shall have an adjustable water-overfeed to prevent mineral precipitation. A high-water detector shall shut down the humidifier to prevent overflowing. A factory-provided air-gap shall prevent backflow of the humidifier supply water.

2.4.1 Steam Generating Canister Humidifier

A canister-type steam canister shall be factory-installed in the cooling unit and shall be controlled by the microprocessor control system. It shall be complete with disposable canister, all supply and drain valves, steam distributor and electronic controls. The need to change canister shall be indicated on the microprocessor control panel. The humidifier shall be designed to operate with water conductivity from 200-500 micromhos. An air-gap within the humidifier assembly shall prevent backflow of the humidifier supply water.

2.5 Reheat

The environmental control unit shall include a factory-installed reheat to control temperature during dehumidification.

2.5.1 3-Stage Electric Reheat

The electric reheat coils shall be low watt density, 304/304 stainless steel fin tubular construction, protected by thermal safety switches, shall be ___ kW (___ BTUH) controlled in three stages. The reheat elements shall be removable from the front of the cabinet.

2.5.1 SCR Electric Reheat

The electric reheat coils shall be low watt density, 304/304 stainless steel fin tubular construction, protected by thermal safety switches, ___ kW (___ BTUH) controlled by multiple pulses to achieve tight temperature control. The reheat elements shall be removable from the front of the cabinet.

2.5.1 Hot Water Reheat

The hot water reheat coil shall have copper tubes and aluminum fins with a capacity of ___ BTUH (kW) when supplied with ___ °F (°C) entering water temperature at ___ GPM (l/s) flow rate. Maximum pressure drop shall be ___ psi (kPa). The hot water reheat control system shall be factory pre-piped with a two-way modulating control valve and cleanable Y-strainer.

2.6 Dual Refrigeration System

Each unit shall include two (2) independent refrigeration circuits and shall include hot gas mufflers (semi-hermetic compressors units only), liquid line filter driers, refrigerant sight glass with moisture indicator, externally equalized expansion valves and liquid line solenoid valves. Compressors shall be located outside the airstream and shall be removable and serviceable from the front of the unit.

2.6.1 Scroll Compressors

The compressor shall be scroll-type. The compressor shall be suction gas cooled motor, vibration isolators, thermal overloads, automatic reset high pressure switch with lockout after three failures, rotalock service valves, pump down low pressure transducer, suction line strainer and a maximum operating speed of 3500 RPM.

2.6.1 Digital Scroll Compressors (28-53kW models only)

The compressor shall be scroll-type with a variable capacity operation capability. Compressor solenoid valve shall unload the compressor and allow for variable capacity operation. The compressor shall be suction gas cooled motor, vibration isolators, thermal overloads, automatic reset high pressure switch with lockout after three failures, rotalock service valves, pump down low pressure transducer, suction line strainer, and a maximum operating speed of 3500 RPM.

2.6.1.1 Crankcase Heaters (Optional)

The compressors shall include crankcase heaters, powered from the indoor unit electric panel.

2.6.2 Evaporator Coil

The evaporator coil shall be A-frame design with off-set orientation and have ____sq. ft. (m²) face area, three rows deep. It shall be constructed of rifled copper tubes and aluminum fins and have a maximum face velocity of ____ ft. per minute (m/s) at ____ CFM (CMH). A stainless steel condensate drain pan shall be provided.

2.6.2.1 Polymeric Coating (Optional)

The coil shall be coated with a high performance polymeric coating process to provide corrosion resistance within 2 to 12 pH range.

2.6.3 R-22 Refrigerant

The system shall be designed for use with R-22 refrigerant.

2.6.3 R-407C Refrigerant

The system shall be designed for use with R-407C refrigerant, which meets the EPA clean air act for phase-out of HCFC refrigerants.

2.7 iCOM™ Microprocessor Control With Small Graphic Display

The iCOM unit control shall be factory-set for Intelligent Control which uses “fuzzy logic” and “expert systems” methods. Proportional and Tunable PID shall also be user selectable options. Internal unit component control shall include the following:

Compressor Short Cycle Control - Prevents compressor short-cycling and needless compressor wear.

System Auto Restart - The auto restart feature will automatically restart the system after a power failure. Time delay is programmable.

Sequential Load Activation - On initial start-up or restart after power failure, each operational load is sequenced with a minimum of one second delay to minimize total inrush current.

Hot Water/Econ-O-Coil Flush Cycles - Hot water reheat coils and Econ-O-Coils are periodically flushed to prevent a buildup of contaminants.

Predictive Humidity Control - calculates the moisture content in the room and prevents unnecessary humidification and dehumidification cycles by responding to changes in dew point temperature.

The iCOM control shall be compatible with all Liebert remote monitoring and control devices. Options are available for BMS interface via MODbus, Jbus, BACNet, Profibus and SNMP.

The iCOM control processor shall be microprocessor based with a 128x64 dot matrix graphic front monitor display and control keys for user inputs mounted in an ergonomic, aesthetically pleasing housing. The display & housing shall be viewable while the unit

panels are open or closed. The controls shall be menu driven. The display shall be organized into three main sections: User Menus, Service Menus and Advanced Menus. The system shall display user menus for: active alarms, event log, graphic data, unit view/status overview (including the monitoring of room conditions, operational status in % of each function, date and time), total run hours, various sensors, display setup and service contacts. A password shall be required to make system changes within the service menus. Service menus shall include: setpoints, standby settings (lead/lag), timers/sleep mode, alarm setup, sensor calibration, maintenance/wellness settings, options setup, system/network setup, auxiliary boards and diagnostics/service mode. A password shall be required to access the advanced menus which include the factory settings and password menus.

The User Menu Shall be Defined as Follows:

Active Alarms: Unit memory shall hold the 200 most recent alarms with time and date stamp for each alarm.

Event Log: Unit memory shall hold the 400 most recent events with id number, time and date stamp for each event.

Graphic Data View: Eight graphic records shall be available: return air temperature, return air humidity, supply air temperature, outdoor temperature and four custom graphs.

Unit View - Status Overview: Simple or Graphical “Unit View” summary displays shall include temperature and humidity values, active functions (and percent of operation) and any alarms of the host unit.

Total Run Hours: Menu shall display accumulative component operating hours for major components including compressors, Econ-O-Coil (FC), fan motor, humidifier and reheat.

Various Sensors: Menu shall allow setup and display of optional custom sensors. The control shall include four customer accessible analog inputs for sensors provided by others. The analog inputs shall accept a 4 to 20 mA signal. The user shall be able to change the input to 0 to 5VDC or 0 to 10VDC if desired. The gains for each analog input shall be programmable from the front display. The analog inputs shall be able to be monitored from the front display.

Display Setup: Customer shall pre-select the desired grouping of display languages at the time of the order from the following choices:

Group 1: English, French, Italian, Spanish, German

Group 2: English, Russian, Greek

Group 3: English, Japanese, Chinese, Arabic

Service Contacts: Menu shall allow display of local service contact name and phone number.

The Service Menu Shall be Defined as Follows:

Setpoints: Menu shall allow setpoints within the following ranges:

- Temperature Setpoint 65-85°F (18-29°C)*
- Temperature Sensitivity +1-10°F (0.6-5.6°C)
- Humidity Setpoint 20-80% RH*
- Humidity Sensitivity 1-30% RH
- High Temperature Alarm 35-90°F (2-32°C)
- Low Temperature Alarm 35-90°F (2-32°C)
- High Humidity Alarm 15-85% RH
- Low Humidity Alarm 15-85% RH

* The microprocessor may be set within these ranges, however, the unit may not be able to control to extreme combinations of temperature and humidity.

Standby Settings/Lead-Lag: Menu shall allow planned rotation or emergency rotation of operating and standby units.

Timers/Sleep Mode: Menu shall allow various customer settings for turning on/off unit.

Alarm Setup: Menu shall allow customer settings for alarm notification (audible/local/remote). The following alarms shall be available:

- High Temperature
- Low Temperature
- High Humidity
- Low Humidity
- Compressor Overload (Optional)
- Main Fan Overload (Optional)
- Humidifier Problem
- High Head Pressure
- Change Filter
- Fan Failure
- Low Suction Pressure
- Unit Off

Audible Alarm: The audible alarm shall announce any alarm that is enabled by the operator.

Common Alarm: A programmable common alarm shall be provided to interface user selected alarms with a remote alarm device.

Remote Monitoring: All alarms shall be communicated to the Liebert monitoring system with the following information: Date and time of occurrence, unit number and present temperature and humidity.

Sensor Calibration: Menu shall allow unit sensors to be calibrated with external sensors.

Maintenance/Wellness Settings: Menu shall allow reporting of potential component problems before they occur.

Options Setup: Menu shall provide operation settings for the installed components.

System/Network Setup: Menu shall allow Unit-to-Unit (U2U) communication and setup for teamwork modes of operation (up to 32 units).

Teamwork Modes of Operation: Saves energy by preventing operation of units in opposite modes multiple units.

Auxiliary Boards: Menu shall allow setup of optional expansion boards.

Diagnostics/Service Mode: The iCOM control shall be provided with self-diagnostics to aid in troubleshooting. The microcontroller board shall be diagnosed and reported as pass/not pass. Control inputs shall be indicated as on or off at the front display. Control outputs shall be able to be turned on or off from the front display without using jumpers or a service terminal. Each control output shall be indicated by an LED on a circuit board.

Advanced Menu

Factory Settings: Configuration settings shall be factory-set based on the pre-defined component operation.

Change Passwords: Menu shall allow new passwords to be set or changed.

2.7.1 iCOM Microprocessor Control With Large Graphic Display (Optional)

The iCOM unit control with large graphic display shall include all of the features as the iCOM with small graphic display, except that it includes a larger graphical display and shall include the additional features of: "System View", Spare Parts List, Unit Diary.

The iCOM control processor shall be microprocessor based with a 320x240 dot matrix graphic front monitor display panel and control keys for user inputs mounted in an ergonomic, aesthetically pleasing housing.

System View - Status Overview: "System View" shall display a summary of operation for the total number of operating units within a Unit-to-Unit (U2U) configuration.

Spare Parts List: Menu shall include a list of critical spare parts, their quantity and part numbers.

Unit Diary: Menu shall include a free field area within the unit memory where unit history may be stored for reference.

2.7.2 iCOM Wall Mount Large Graphic Display (Optional)

The iCOM Large Graphic Display Kit shall include an ergonomic, aesthetically pleasing housing, a 320x240 dot matrix graphic display and a 120V power supply. The Wall Mount Large Graphic Display shall be used to allow remote location of a "System View" display and all features of the Large Graphic User, Service and Advanced menus for use with Liebert iCOM controlled products connected for Unit-to-Unit (U2U) communications.

2.8 Dual-Cooling Source

The dual-cooling source system shall consist of an air- or water-cooled compressorized system with the addition of a chilled water coil (Econ-O-Coil), a modulating control valve and a comparative temperature sensor. The system shall be able to function either as a modulating chilled water system or as a compressorized system, or a combination of both. The primary cooling mode shall be chilled water. Switchover between the two cooling modes shall be performed automatically by the microprocessor control. Four (4) pipes shall be included on water/glycol systems: Econ-O-Coil supply, Econ-O-Coil return, condenser supply and condenser return.

2.8.1 Dual-Cooling Source Control Valve

The water circuit shall include a three-way modulating valve. The microprocessor positions the valve in response to room conditions. Cooling capacity will be controlled by bypassing chilled water around the coil. The modulating valve travel for dehumidification shall be proportional.

2.8.2 Cu-Ni Coil (Optional)

A 70/30 Cu-Ni Econ-O-Coil shall be provided for Dual-Cooling units that are applied to a cooling tower loop or other open water system. This option is required on open cooling tower applications.

2.8.3 Polymeric Coating on Econ-O-Coil and DX Coil (Optional)

The coil shall be coated with a high performance polymeric coating process to provide corrosion resistance within 2 to 12 pH range.

2.9 Miscellaneous Options

2.9.1 Non-Locking Disconnect Switch (Optional)

The manual disconnect switch shall be mounted in the high voltage section of the electrical panel. The switch shall be accessible with the door closed.

2.9.1 Locking Disconnect Switch (Optional)

The manual disconnect switch shall be mounted in the high voltage section of the electrical panel. The switch shall be accessible from the outside of the unit with the door closed and prevent access to the high voltage electrical components until switched to the "OFF" position.

2.9.2 High Temperature Sensor (Optional)

The firestat shall be factory-installed in the unit and shall be factory-set to 125°F (52°C). It shall immediately shut down the environmental control system when activated. The sensor shall be mounted with the sensing element in the return air.

2.9.3 Smoke Sensor (Optional)

The smoke sensor shall immediately shut down the environmental control system and activate the alarm system when activated. The smoke sensor shall be mounted in the electrical panel with the sensing element in the return air compartment. The smoke sensor is not intended to function as or replace any room smoke detection system that may be required by local or national codes. The smoke sensor shall include a supervision contact closure.

2.9.4 Condensate Pump, Dual Float (Optional)

The condensate pump shall have a minimum capacity of 145 GPH (548 l/h) at 20 ft. (58 kPa) head. It shall be complete with integral dual-float switches, pump-and-motor assembly and reservoir. The secondary float shall send a signal to the local alarm and shut down the unit upon high water condition.

2.9.5 Low Voltage Terminal Package (Optional)

Factory-installed and wired terminals shall be provided for customer connection to lock out the reheat and humidifier upon contact closure. Two (2) extra N/O common alarm contacts shall be provided. Two (2) extra remote shutdown terminals shall be provided.

2.9.6 Remote Humidifier Contact (Optional)

A pair of N/O contacts shall be provided for connection to a remote humidifier.

2.9.7 Main Fan Overload (Optional)

A pair of N/O contacts shall be factory-installed and wired to indicate Main Fan Overload.

2.9.8 Compressor Overload (Optional)

A pair of N/O contacts shall be factory-installed and wired to each compressor to indicate Compressor Overload.

2.10 Air-Cooled Systems

The indoor evaporator unit shall include refrigerant piping, with a factory holding charge of nitrogen. The hot-gas and liquid lines shall be spun shut and shall include a factory-installed Schrader valve. Field relief of the Schrader valve shall indicate a leak-free system.

2.10.1 Air-Cooled Condenser

The Liebert manufactured outdoor air-cooled condenser shall be the low profile, multiple direct drive, propeller fan type. The condenser shall balance the heat rejection of the compressor at ____ °F (°C) ambient. The condenser shall be constructed of aluminum and contain a copper tube, aluminum fin coil arranged for (horizontal) (vertical) air discharge.

2.10.1.1 Fan Speed Control

The winter control system for the air-cooled condenser shall be Liebert Fan Speed Control. The variable speed motor shall operate from 0 to 230 volts single phase, 10 to 1050 RPM. It shall be designed with ball bearings, permanent lubrication, internal overload protection, 40°C rise at full speed, 65°C rise at 10 RPM. The control system shall be complete with transducers, thermostats and electrical control circuit, factory prepackaged in the integral condenser control box. The transducer shall automatically sense the highest head pressure of either operating compressor and control the variable speed fan on the air-cooled condenser to properly maintain the head pressure. The fan speed control system shall provide positive startup and operation in ambient temperature as low as -20°F (-28.9°C). The air-cooled condenser shall have a ___ volt, ___ ph ___ Hz power supply.

2.10.1.1 Lee-Temp System

The winter control system for the air-cooled condenser shall be Lee-Temp. The Lee-Temp system shall allow startup and positive head pressure control with ambient temperatures as low as -30°F (-34.4°C). The Lee-Temp package shall include the following components for each refrigeration circuit: insulated receiver, pressure relief valve, head pressure three-way control valve and rotalock valve for isolating the refrigerant charge. The Lee-Temp receiver shall be factory-insulated and mounted ready for the field connection to the air-cooled condenser. The Lee-Temp heater shall require a separate power supply of ___ volt, single phase.

2.10.2 Quiet-Line Condenser (Optional)

Fan motors shall be 12-pole, 570 RPM, equipped with rain shields and permanently sealed ball bearings. Motors shall include built-in overload protection. Motors shall be rigidly mounted on die-formed galvanized steel supports. Disconnect switch shall be a standard feature.

2.10.3 Condenser Disconnect Switch (Optional)

A disconnect switch shall be factory-mounted and wired to the condenser control panel, accessible from the exterior (standard on Quiet-Line models).

2.10 Water/Glycol Systems

2.10.1 Paradenser™ Condenser

The water-cooled condensers for each circuit shall be cleanable, shell-and-tube, counter flow type. The heads shall be removable to allow for cleaning of the water tubes. Condensers shall be rated for a maximum refrigerant pressure of 400 psi at 200°F (2758 kPa at 93.3°C). The condenser shall be capable of operating with R-22 or R-407C refrigerant. The unit shall require ___ GPM (l/m) of ___ °F (°C) water and have a maximum pressure drop of ___ psi (kPa).

2.10.2 Water/Glycol Regulating Valve, 2-Way With Bypass

The condenser shall be pre-piped with a two-way regulating valve which is head pressure actuated. A gate-valve shall bypass the regulating valve.

2.10.2 Water/Glycol Regulating Valve, 3-Way

The condenser shall be pre-piped with a three-way regulating valve which is head pressure actuated.

2.10.3 Pressure Rating, 150 psi (1034 kPa)

The condenser water circuit shall be designed for a pressure of 150 psi (1034 kPa)

2.10.3 Pressure Rating, 350 psi (2413 kPa)

The condenser water circuit shall be designed for a pressure of 350 psi (2413 kPa)

2.10.4 GLYCOOL Systems

2.10.4.1 GLYCOOL Coil

The GLYCOOL (Econ-O-Coil) shall be constructed of copper tubes and aluminum fins. The coil shall be A-frame or V-frame in order to minimize air pressure drop, and shall be nested with the DX coil. The Econ-O-Coil shall be upstream of the DX coil to enable pre-cooling of the air.

The Econ-O-Coil shall have a net Sensible Cooling Capacity of ___ BTUH (kW) with 45°F (7.2°C) entering glycol solution temperature. The system shall require ___ GPM (l/s) and the total unit pressure drop shall not exceed ___ feet of water (kPa), when in the Econ-O-Coil mode of operation.

2.10.4.2 GLYCOOL Three-Way Control Valve

The GLYCOOL coil shall be equipped with a fully proportional 3-way control valve. This motorized control valve shall control the amount of flow to the GLYCOOL (Econ-O-Coil) coil to control room temperature and relative humidity.

2.10.4.3 High Pressure System, 350 psi (2413 kPa)

The GLYCOOL system shall be designed for a pressure of 350 psi (2413 kPa).

2.10.4.3 Cu-Ni Econ-O-Coil

A 70/30 Cu-Ni Econ-O-Coil shall be provided for when the Econ-O-Coil is cooling tower loop or other open water system. This option is required on open cooling tower applications.

2.11 Drycooler

The drycooler shall be the low profile, slow speed, multiple direct drive, propeller fan type. The drycooler shall be constructed of aluminum and contain a copper tube aluminum fin coil with an integral electric control panel and disconnect switch. The drycooler shall be designed for ____ °F (°C) ambient.

2.11.1 Pump Package

This system shall be provided with a centrifugal pump mounted in a weatherproof and vented enclosure. The pump shall be rated for ____ GPM (l/m) at ____ ft. of head (kPa) and operate on ____ volt, 3-phase, ____ Hz.

2.11.1 Dual Pump Package

The dual pump package shall include pumps, enclosure, field mounted flow switch and a separate factory-wired control box (including a lead/ lag switch for the pumps). The standby pump shall automatically start upon failure of the lead pump. Each pump shall be rated for ____ GPM (l/s) at ____ feet of head (kPa).

2.12 Liqui-tect Sensors

Provide ____ (quantity) solid state water sensors under the raised floor.

2.13 Floor Stand

The floor stand shall be constructed of a welded steel frame. The floor stand shall have adjustable legs with vibration isolation pads. The floor stand shall be ____ inches (mm) high.

2.13.1 Seismic Rated Floor Stand (Optional)

The floor stand shall be seismic rated and shall be bolted to the unit frame.

2.13.2 Floor Stand Turning Vane (Optional)

A turning vane shall be supplied with the floor stand and shall be designed for the specified floor stand height.

2.14 Plenum (Optional)

The air plenum shall be constructed of 20 gauge steel, powder coated to match unit color. The plenum shall be ____" high.

2.14.1 Top Return Plenum (Downflow)

The plenum shall be open at the top and shall be attached to the top of the unit. Front panel shall be removal to allow access to filter section.

3.0 EXECUTION

3.1 Installation of Precision Air Conditioning Units

3.1.1 General

Install precision air conditioning units in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.

3.1.2 Electrical Wiring

Install and connect electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's electrical connection diagram submittal to electrical contractor.

3.1.3 Piping Connections

Install and connect devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's piping connection diagram submittal to piping contractor.

3.1.4 Field Quality Control

Start up cooling units in accordance with manufacturer's startup instructions. Test controls and demonstrate compliance with requirements. These specifications describe requirements for a computer room environmental control system. The system shall be designed to maintain temperature and humidity conditions in the rooms containing electronic equipment.

The manufacturer shall design and furnish all equipment to be fully compatible with heat dissipation requirements.

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- Environmental systems—close-control air conditioning from 1 to 60 tons
- Power conditioning and UPS with power ranges from 300 VA to more than 1000 kVA
- Integrated systems that provide both environmental and power protection in a single, flexible package
- Monitoring and control—from systems of any size or location, on-site or remote
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