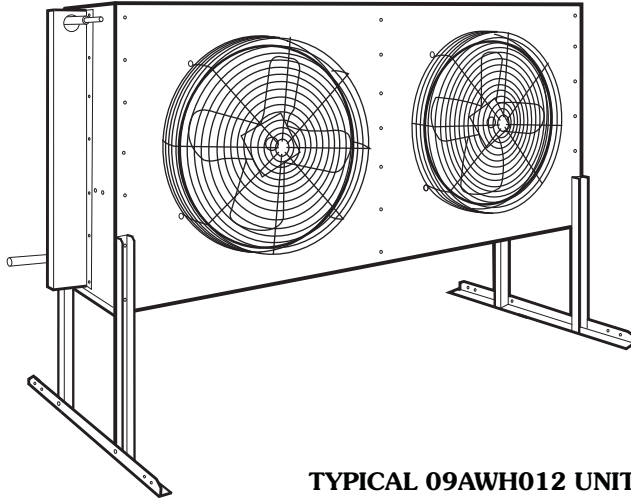




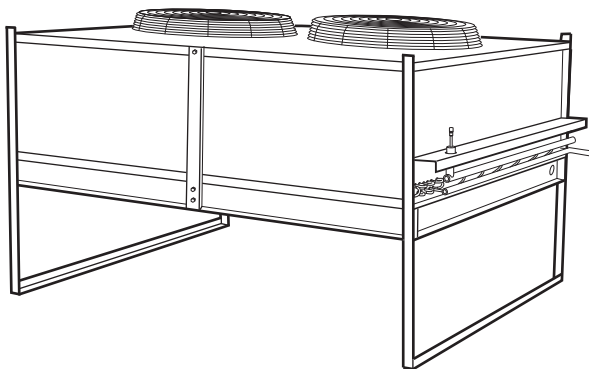
Product Data

09AW,AZ001-020 Air-Cooled Condensers

1 to 20 Nominal Tons



TYPICAL 09AWH012 UNIT



TYPICAL 09AWV012 UNIT

Air-Cooled Condensers for Remote System Application. Eleven sizes to choose from with:

- Standard or low sound motor
- Proven performance in every building application
- Efficient direct-drive fans
- Cabinet designs in vertical and horizontal airflow configurations to meet a variety of application requirements
- Small compact footprints for installation in tight spaces
- A choice of factory-installed options that allow application customizing
- High-efficiency performance for commercial and industrial projects

Features/Benefits

A family of ruggedly built condensers ideal for clinics, motels, schools, apartment and office buildings, and factories.

Design flexibility

Carrier remote condensers provide the design flexibility required in replacement, renovation, and new construction. Units are available in 11 sizes from 1 to 20 tons. These condensers meet the needs for cooling restaurants, retail stores, warehouses, offices, and building additions.

Flexibility in meeting job requirements is ensured with unit design and available factory options. The compact footprint saves valuable space and allows installation in tight locations. Matching condensers to existing indoor units is easy with a selection of coil circuiting. These units can be installed in vertical or horizontal



airflow configurations allowing greater flexibility to meet job requirements. Units may also be used with several different refrigerants. Units are available in all popular single or three phase voltages and with factory-mounted control options.

Easy installation and maintenance

Units are completely pre-piped and wired at the factory to ensure time and money saving installation and service. Access panels are easily removed to provide speedy inspection and service of internal components. Factory-installed electrical junction box provides space for control connections. With factory-installed control options, such as head pressure control and factory circuiting, the unit arrives at the jobsite ready for installation. This reduces field labor. Mounting legs, shipped with the unit, are provided for all sizes. Precision engineered parts translate to a quality built, reliable design that will operate efficiently, minimize service calls, and provide years of reliable operation.

Quieter, more efficient operation

High efficiency direct-drive condenser fans with bell mouthed orifices provide large quantities of condenser air at low sound levels. Optional unit with lower-speed motor allows even quieter operation when necessary to meet local sound requirements.

Special features for outstanding performance

- Space saver slab type condenser coils use Carrier’s advanced heat transfer technology and provide peak heat transfer efficiency with large coil face area. Fins are mechanically bonded to nonferrous seamless tubing for efficient leak-free operation.
- Quiet fan performance efficiently moves large volumes of outdoor air. Specially designed discharge and fan sections provide superior air handling capability with high efficiency and low sound.
- Convenient access electrical control center contains all factory pre-wired control devices.

- The weather-resistant cabinets are constructed of galvanized steel and are capable of withstanding Federal test method Standard No. 141 (Method 6061) 500-hour salt spray test.
- A choice of motor controls provides the flexibility to meet most application requirements.
- The 09AW,AZ units are fully warranted as shipped from the factory, including 1 year on all parts.
- All motors are protected against thermal overload and 3-phase motors are protected against single-phasing conditions.
- The 09AZ units are specifically customized with options required for use with the 50BZ006 to 016 indoor units.
- This includes appropriate circuiting with subcooling, condenser-fan contactors, and optimized coil surface.

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Model number nomenclature



09 AW H 012 V E - 6 0 1 A

ECOZONE™

09 – Remote
Air-Cooled
Condenser

AW – Direct-Drive
General Purpose

Configuration

H – Horizontal, Standard Motor
V – Vertical, Standard Motor*
L – Horizontal, Low Sound Motor
W – Vertical, Low Sound Motor*

Nominal Heat Rejection

Size	Tons	Size	Tons
001	– 1	012	– 10
002	– 2	014	– 12
003	– 3	016	– 15
004	– 4	018	– 17
006	– 5	020	– 20
008	– 7-1/2		

Motor Control Option

- – Open Drip Proof (ODP)
C – Contactors, ODP
F – Fan Cycling, ODP†
V – Speed Control, ODP**
T – Totally Enclosed, Air Over Motor (TEAO)
E – Contactors, TEAO
D – Fan Cycling, TEAO†

Circuiting Option

- – Single Circuit, No Subcooling
A – Single Circuit with Subcooling
D – Two Circuit, No Subcooling
E – Two Circuit with Subcooling

Factory Options

A – Aluminum Cabinet
B – Fused Disconnect††
C – 24 Volt Transformer
D – Aluminum Cabinet, Fused Disconnect††
E – Aluminum Cabinet, 24 Volt Transformer
F – Fused Disconnect, 24 Volt Transformer
G – Aluminum Cabinet, Fused Disconnect,
24 Volt Transformer††

Packaging

1 – Standard

Design Series

V-Ph-Hz

1 – 575-3-60 (sizes 014-020) or
575-1-60 (sizes 001-012)
3 – 208/230-1-60
5 – 208/230-3-60
6 – 460-3-60

Coil Construction Option

- – Aluminum Fin/Copper Tube
C – Copper Fin/Copper Tube
E – Polyester Coated Aluminum Fin/Copper Tube
X – E-Coated Aluminum Fin/Copper Tube
Z – E-Coated Copper Fin/Copper Tube

*Units 014-020 only. Sizes 001 to 012 may be field mounted for vertical or horizontal airflow.

†Fan cycling includes contactors.

**Speed control includes contactors on all units and fan cycling on 006 to 020 unit sizes.

††Fused disconnect available on 3-phase units only.

Model number nomenclature (cont)



09 AZ H 012 V - - 3 0 1 A

ECOZONE™

09 – Remote
Air-Cooled
Condenser

AZ – Direct-Drive
(Sized to Work Best with 50BZ)

Configuration

H – Horizontal, Standard Motor
V – Vertical, Standard Motor*
L – Horizontal, Low Sound Motor
W – Vertical, Low Sound Motor*

Nominal Heat Rejection

Size	Tons	Size	Tons
006	– 5	014	– 12
008	– 7-1/2	016	– 15
012	– 10		

Motor Control Option

- – Open Drip Proof (ODP) with Contactors
F – Fan Cycling, ODP
V – Speed Control, ODP†
T – Totally Enclosed, Air Over Motor (TEAO)
with Contactor
D – Fan Cycling, TEAO

Circuiting Option

- – Single Circuit or Two Circuit
with Subcooling**

Factory Options

A – Aluminum Cabinet
B – Fused Disconnect††
D – Aluminum Cabinet, Fused Disconnect††
F – Fused Disconnect, 24 Volt Transformer††

Packaging

1 – Standard

Design Series

V-Ph-Hz

1 – 575-3-60 (sizes 012-016) or
575-1-60 (sizes 006-008)
3 – 208/230-1-60
5 – 208/230-3-60
6 – 460-3-60

Coil Construction Option

- – Aluminum Fin/Copper Tube
C – Copper Fin/Copper Tube
E – Polyester Coated Aluminum Fin/Copper Tube
X – E-Coated Aluminum Fin/Copper Tube
Z – E-Coated Copper Fin/Copper Tube

*Units 012-016 only. Sizes 006 to 008 may be field mounted for vertical or horizontal airflow.

†Fan cycling included with speed control on 008 to 016 size units.

**As required with 50BZ of the same tonnage size.

††Fused disconnect available on 3-phase units only.

ARI* capacities



UNIT 09	NOMINAL TONS	OUTDOOR Cfm	HEAT REJECTION (Btuh)	TOTAL kW	
AWH, AWV	001	1	3,100	20,200	0.46
	002	2	2,750	34,300	0.46
	003	3	3,850	55,400	0.46
	004	4	3,700	72,500	0.46
	006	5	7,700	110,500	0.92
	008	7½	7,400	145,000	0.92
	012	10	7,000	166,000	0.92
	014	12	15,700	217,300	1.84
	016	15	15,600	243,000	1.84
	018	17	15,400	290,000	1.84
020	20	15,300	318,000	1.84	
AWL, AWW	001	1	2,540	19,100	0.28
	002	2	2,040	30,000	0.28
	003	3	2,850	47,000	0.28
	004	4	2,740	60,500	0.28
	006	5	5,700	93,700	0.55
	008	7½	5,480	121,000	0.55
	012	10	5,110	133,000	0.55
	014	12	11,600	190,000	1.00
	016	15	11,400	206,000	1.00
	018	17	11,500	246,000	1.00
020	20	11,300	265,000	1.00	
AZH, AZV	006	5	3,600	75,700	0.46
	008	7½	7,500	134,700	0.92
	012	10	15,260	166,000	1.84
	014	12	15,132	221,000	1.84
	016	15	14,872	256,000	1.84
AZL, AZW	006	5	6,400	76,600	0.55
	008	7½	5,300	112,000	0.55
	012	10	11,070	180,000	1.00
	014	12	10,872	219,000	1.00
	016	15	10,566	254,000	1.00

*Air Conditioning and Refrigeration Institute.

NOTES:

1. Based on a temperature difference of 30° F.
2. ARI rating condition with R-22 is 95 F air entering the condenser, 125 F saturated condensing temperature, charged to nominal system charge per installation instructions for 5° F of subcooling.
3. Units are only ARI rated when used as part of a system with 50BZ units. ARI ratings do not exist for the 09AW,AZ condensers alone.

Physical data



UNIT	09AWH/AWV										
	001	002	003	004	006	008	012	014	016	018	020
RATING (Tons)	1	2	3	4	5	7½	10	12	15	17	20
OPERATING WEIGHT (lb)	109	121	144	160	234	259	283	510	518	536	555
SHIPPING WEIGHT (lb)	153	165	188	204	303	328	352	632	642	664	688
REFRIGERANT	R-22/R-134a										
NOM HEAT REJECTION (MBtuh)*	16.8	28.6	46.2	60.5	92.1	120.9	138.5	181.0	202.2	241.7	264.7
FAN	Direct Drive										
Quantity	1	1	1	1	2	2	2	2	2	2	2
Prop. Diameter (in.)	18	18	22	22	22	22	22	26	26	26	26
Blade Quantity	4	4	4	4	4	4	4	4	4	4	4
Rpm	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140
Total Airflow (cfm)	3100	2750	3850	3700	7700	7400	7000	15,700	15,600	15,400	15,300
Motor Hp (per fan)†	½	½	½	½	½	½	½	1½	1½	1½	1½
COIL	Cu Tube/Al Fin or Cu Tube/Cu Fin or Cu Tube with Coated Fin										
Arrangement	May be mounted Vertical/Horizontal**										
Rows	1	2	2	3	2	3	4	2	2	3	3
Fins/in.	8	8	10	10	10	10	10	8	10	8	10
Total Face Area (sq ft)	4.34	4.34	6.25	6.25	12.5	12.5	12.5	30.0	30.0	30.0	30.0
Number of Circuits	1	1 or 2									
Subcooler	Optional										
CONNECTIONS (in.)***											
In, 1 Circuit	5/8	7/8	7/8	7/8	1½	1¾	1¾	1¾	1¾	1¾	1¾
Out, 1 Circuit	5/8	5/8	5/8	5/8	7/8	7/8	11/8	11/8	11/8	13/8	13/8
In, 2 Circuit	N/A	5/8	5/8	7/8	7/8	7/8	11/8	11/8	11/8	11/8	13/8
Out, 2 Circuit	N/A	5/8	5/8	5/8	5/8	5/8	7/8	7/8	7/8	7/8	11/8

UNIT	09AWL/AWV										
	001	002	003	004	006	008	012	014	016	018	020
RATING (Tons)	1	2	3	4	5	7½	10	12	15	17	20
OPERATING WEIGHT (lb)	109	121	144	160	234	259	283	510	518	536	555
SHIPPING WEIGHT (lb)	153	165	188	204	303	328	352	636	649	693	709
REFRIGERANT	R-22/R-134a										
NOM HEAT REJECTION (MBtuh)*	15.9	25.0	39.2	50.4	78.1	100.9	111.1	158.3	171.5	205.2	221.0
FAN	Direct Drive										
Quantity	1	1	1	1	2	2	2	2	2	2	2
Prop. Diameter (in.)	18	18	22	22	22	22	22	26	26	26	26
Blade Quantity	4	4	4	4	4	4	4	4	4	4	4
Rpm	850	850	850	850	850	850	850	850	850	850	850
Total Airflow (cfm)	2540	2040	2850	2740	5700	5480	5110	11,600	11,400	11,500	11,300
Motor Hp (per fan)†	¼	¼	¼	¼	¼	¼	¼	½	½	½	½
COIL	Cu Tube/Al Fin or Cu Tube/Cu Fin or Cu Tube with Coated Fin										
Arrangement	May be mounted Vertical/Horizontal**										
Rows	1	2	2	3	2	3	4	2	2	3	3
Fins/in.	8	8	10	10	10	10	10	8	10	8	10
Total Face Area (sq ft)	4.34	4.34	6.25	6.25	12.5	12.5	12.5	30.1	30.1	30.1	30.1
Number of Circuits	1	1 or 2									
Subcooler	Optional										
CONNECTIONS (in.)***											
In, 1 Circuit	5/8	7/8	7/8	7/8	1½	1¾	1¾	1¾	1¾	1¾	1¾
Out, 1 Circuit	5/8	5/8	5/8	5/8	7/8	7/8	11/8	11/8	11/8	13/8	13/8
In, 2 Circuit	N/A	5/8	5/8	7/8	7/8	7/8	11/8	11/8	11/8	11/8	13/8
Out, 2 Circuit	N/A	5/8	5/8	5/8	5/8	5/8	7/8	7/8	7/8	7/8	11/8

LEGEND

MBtuh — Btuh in Thousands

*Heat rejection is based on 25 F temperature difference from saturated discharge temperature to entering-air temperature.

†Motors on single phase units sizes 014-020 are 1 hp.

**Units may be mounted vertically or horizontally.

††Unit is factory ordered for vertical or horizontal discharge.

***Connection sizes depend on number of circuits used.



UNIT	09AZH/AZV					09AZL/09AZW				
	006*	008*	012	014	016	006*	008*	012	014	016
RATING (Tons)	5	7½	10	12	15	5	7½	10	12	15
OPERATING WEIGHT (lb)	160	259	510	518	518	234	259	518	536	555
SHIPPING WEIGHT (lb)	204	328	632	632	632	303	328	632	654	688
REFRIGERANT	R-22/R-134a									
NOM HEAT REJECTION (MBtuh)†	75.8	111.5	152.6	184.1	213.4	76.6	112.0	150.2	182.2	211.6
FAN	Direct Drive									
Quantity	1	2	2	2	2	2	2	2	2	2
Prop. Diameter (in.)	22	22	26	26	26	22	22	26	26	26
Blade Quantity	4	4	4	4	4	4	4	4	4	4
Rpm	1140	1140	1140	1140	1140	825	825	825	825	825
Total Airflow (cfm)	3600	7500	15,260	15,132	14,872	6400	5300	11,070	10,872	10,566
Motor Hp (per fan)	½	½	1½	1½	1½	¼	¼	½	½	½
COIL	Cu Tube/Al Fin or Cu Tube/Cu Fin or Cu Tube with Coated Fin									
Arrangement	**		††			**		††		
Rows	3	3	2	2	2	2	3	2	3	3
Fins/in.	14	12	8	10	14	10	14	10	8	12
Total Face Area (sq ft)	6.25	12.5	30.0	30.0	30.0	12.5	12.5	30.0	30.0	30.0
Number of Circuits	1		2			1		2		
Subcooler	Standard									
CONNECTIONS (in.)										
In, 1 Circuit	7/8	1¾	N/A	N/A	N/A	1½	1¾	N/A	N/A	N/A
Out, 1 Circuit	5/8	1½	N/A	N/A	N/A	7/8	1½	N/A	N/A	N/A
In, 1 Circuit	N/A	N/A	7/8	1½	1½	N/A	N/A	7/8	1½	1¾
Out, 2 Circuit	N/A	N/A	7/8	7/8	7/8	N/A	N/A	7/8	7/8	1½

LEGEND

MBtuh — Btuh in Thousands

*Sizes 006 and 008 are shipped in horizontal configuration. Units may be field converted to vertical configuration.

†Heat rejection is based on 25 F temperature difference from saturated discharge temperature to entering-air temperature.

**Unit may be mounted vertically or horizontally.

††Unit is factory ordered for vertical or horizontal discharge.

Factory-installed options



Coil fin treatment options

Coils may be supplied with copper, precoated or E-coated fins, to provide optimum corrosion resistance in a variety of applications.

Circuiting options

Coils may be factory ordered for single or dual circuit applications. A last pass subcooling circuit piped from the liquid end header can be provided if required by the application. The 09AZ units have circuiting to match same size 50BZ units and subcooler standard.

Motor option

Totally Enclosed, Air Over design motors may be used when required for harsh environments. Low sound fan motors can be provided for acoustically sensitive environments.

Motor control options

Factory-installed controls can provide 24-volt operated fan contactors and fan cycling control 2-fan units (include fan

contactor). Speed control fan cycling control modulates fan speed to maintain minimum condensing pressure for operational temperatures as low as -20 F. Factory mounted on lead fan motor fan cycling and fan contacts are also provided on two-fan units.

Fused disconnect

Power circuit fused disconnect switch can be factory-mounted on 3-phase units.

Control transformer

Line voltage to 24 v 40 va control transformer is factory-mounted for control of condenser and indoor unit. (Not available on 09AZ units.)

Aluminum cabinet

Cabinet can be fabricated with embossed aluminum for a more attractive, corrosion-resistant cabinet finish.

Field-installed accessories

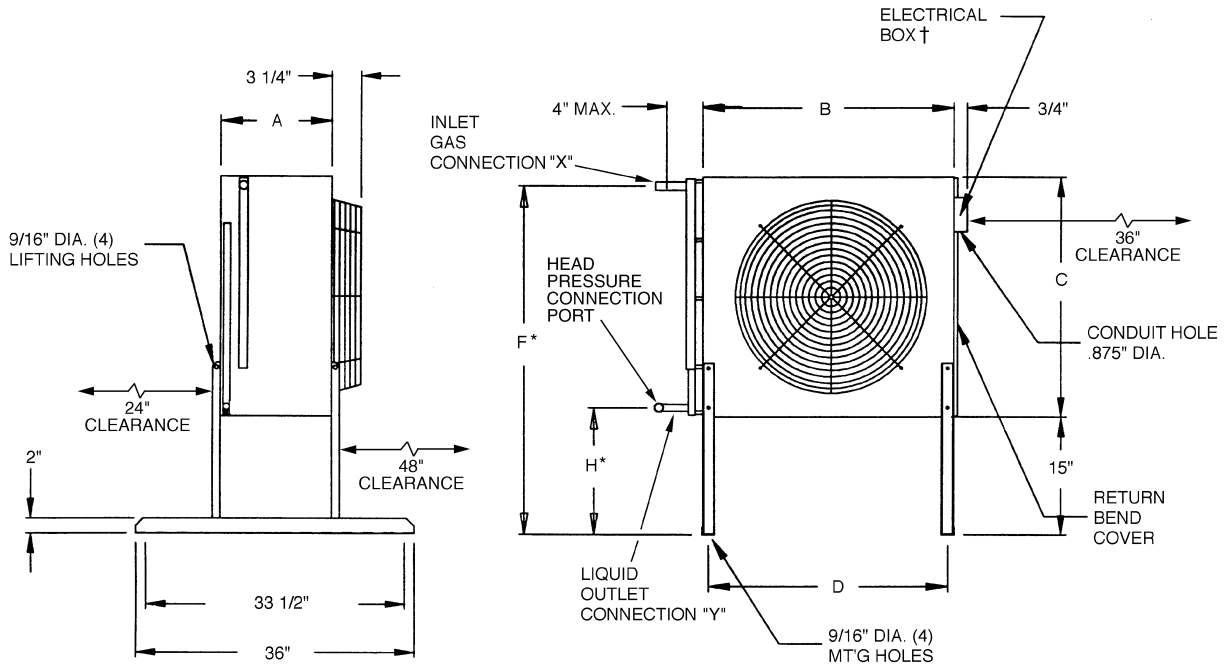
Mounting legs

Extended length legs are field installed, for use on 09AW014 to 020 and 09AZ012 to 016 units. 30 in., 48 in. and 72 in. are available.

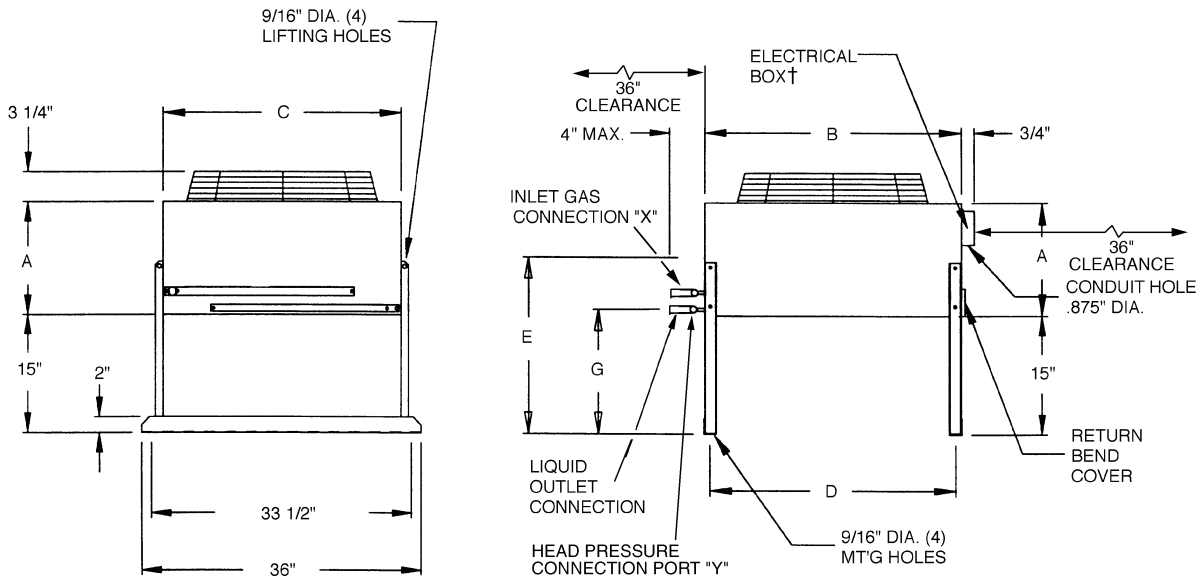
Base unit dimensions



09AWH,AWL001-004 HORIZONTAL DISCHARGE



VERTICAL DISCHARGE



*Coil connection dimensions reflect single circuit units.
†Control box size varies depending on control options.

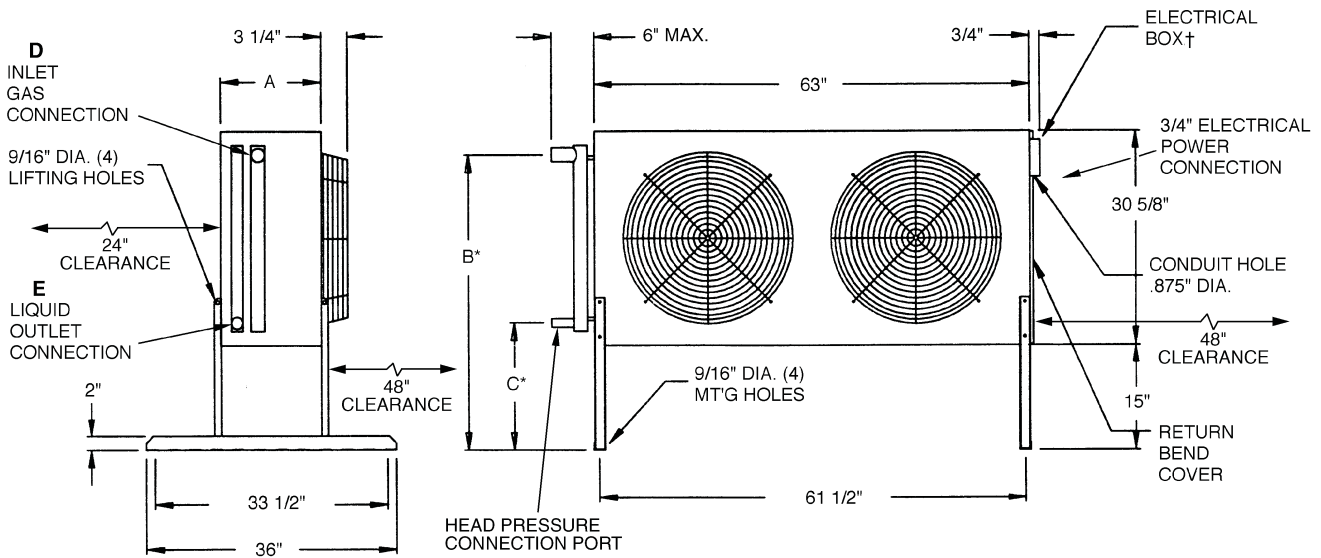
UNIT	FAN QUANTITY	TOTAL WEIGHT (lbs)	DIMENSIONS (in.)												
			A	B	C	D	E**	F**	G**	H**	1 Ckt		2 Ckt		
											X	Y	X	Y	
09AWH, 09AWL	001	1	109	12 1/2	28	25 5/8	26 1/2	16 1/2	40	15	16 1/4	5/8	5/8	—	—
	002	1	121	12 1/2	28	25 5/8	26 1/2	17 1/2	40	15	16 1/4	7/8	5/8	5/8	5/8
	003	1	144	14 1/2	33	30 5/8	31 1/2	17 1/2	45	15	16 1/4	7/8	5/8	7/8	5/8
	004	1	160	14 1/2	33	30 5/8	31 1/2	18 3/4	45	15	16 1/4	1 1/8	7/8	7/8	5/8

**Approximate dimensions.

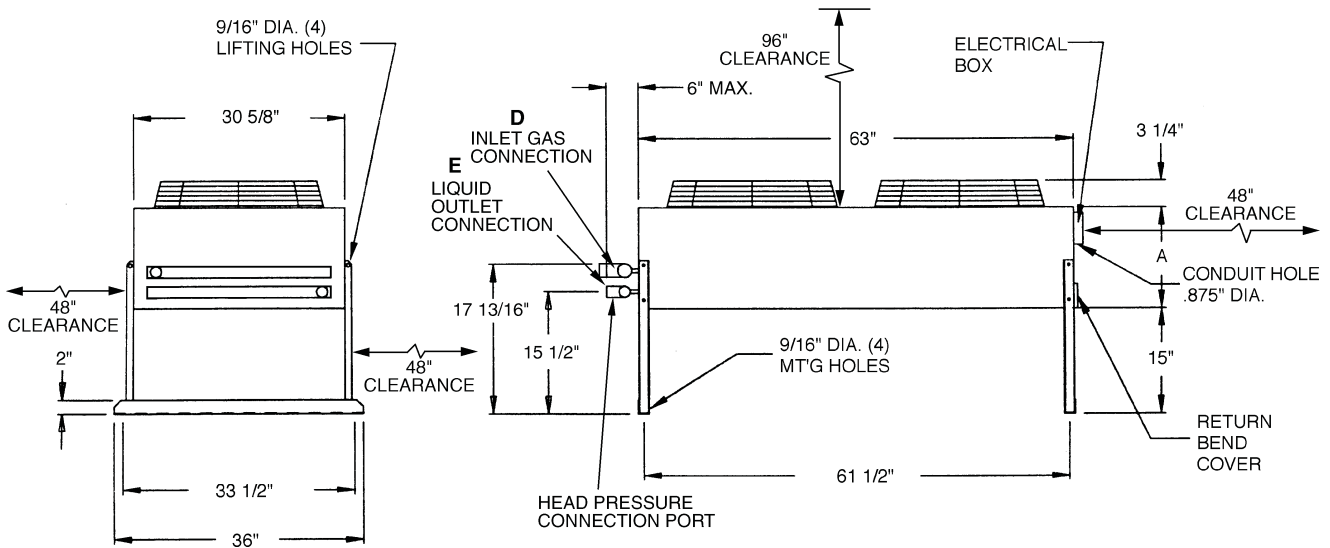
Base unit dimensions (cont)



09AWH,AWL006-012 HORIZONTAL DISCHARGE



VERTICAL DISCHARGE

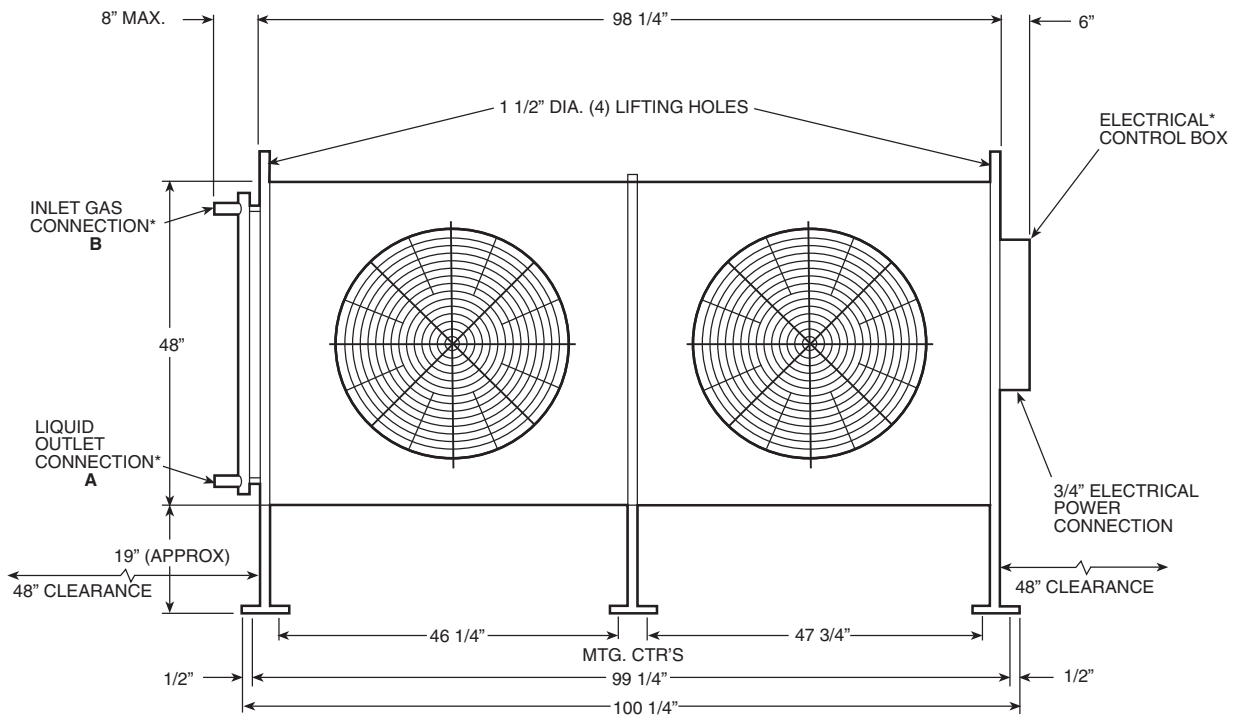
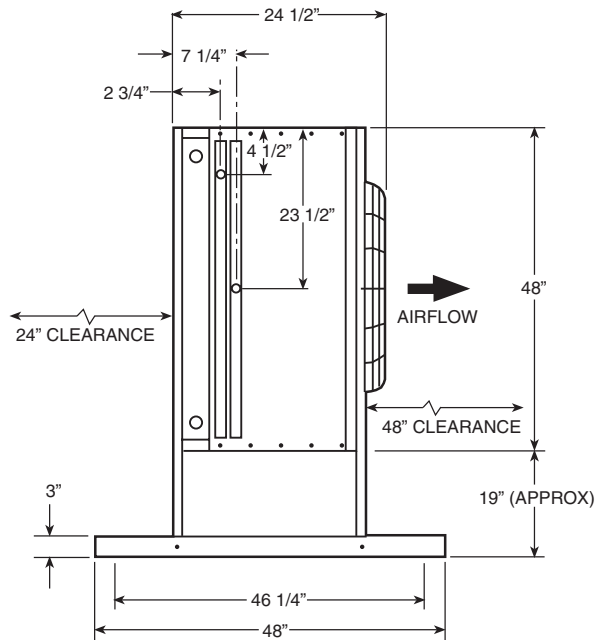


*Coil connection dimensions reflect single circuit units.
†Control box size varies depending on control options.

UNIT	FAN QUANTITY	TOTAL WEIGHT (lbs)	DIMENSIONS (in.)							
			A**	B**	C**	Ckt 1		Ckt 2		
						D	E	D	E	
09AWH,09AWL	006	2	234	14 ¹ / ₂	37 ³ / ₈	16 ³ / ₄	1 ¹ / ₈	7 ⁷ / ₈	7 ⁷ / ₈	5 ⁵ / ₈
	008	2	259	14 ¹ / ₂	44 ¹ / ₈	16 ⁷ / ₈	1 ³ / ₈	1 ¹ / ₈	7 ⁷ / ₈	5 ⁵ / ₈
	012	2	283	15 ³ / ₄	41	16 ⁷ / ₈	1 ³ / ₈	1 ¹ / ₈	1 ¹ / ₈	7 ⁷ / ₈

**Approximate dimensions.

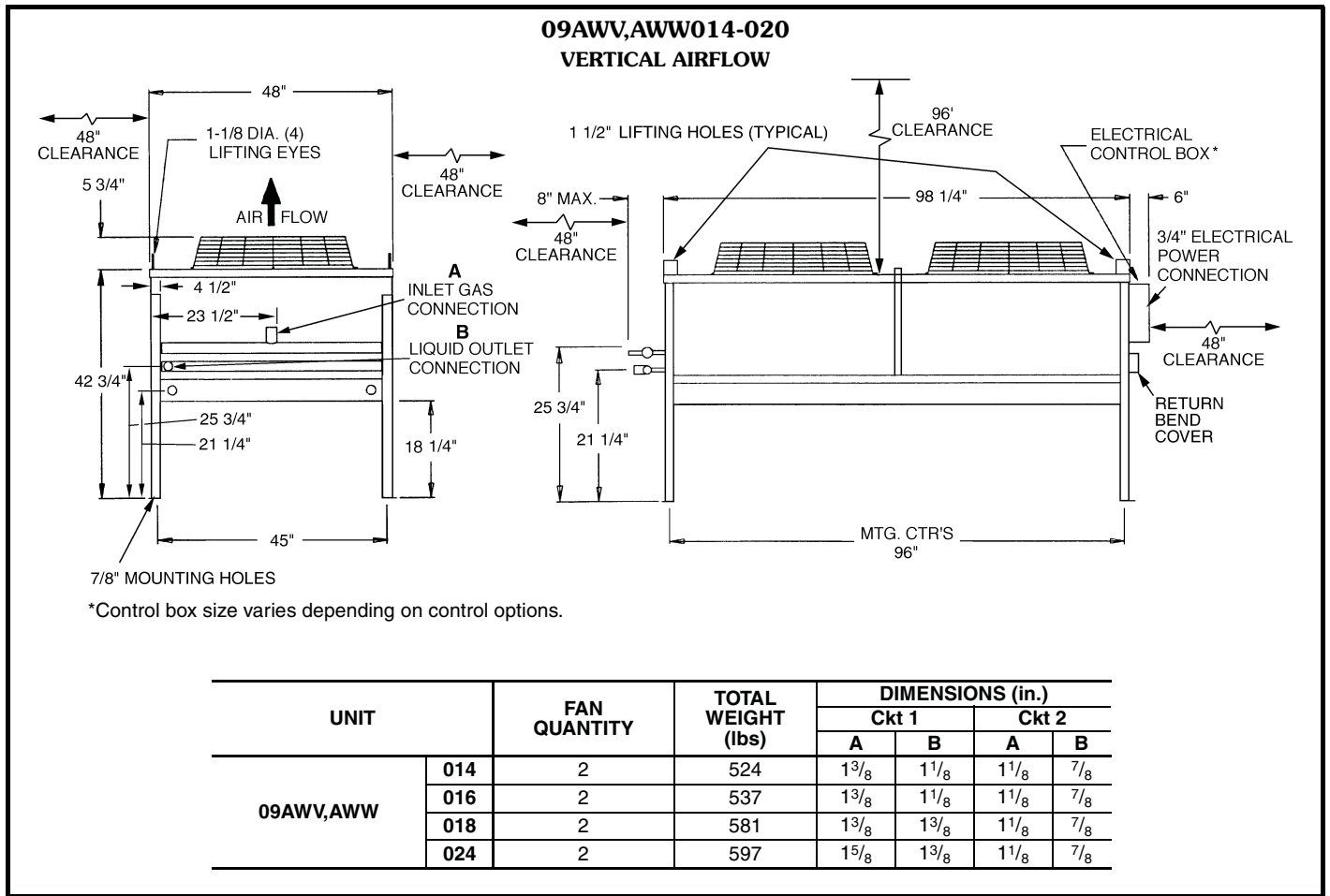
**09AWH,AWL014-020
HORIZONTAL DISCHARGE**



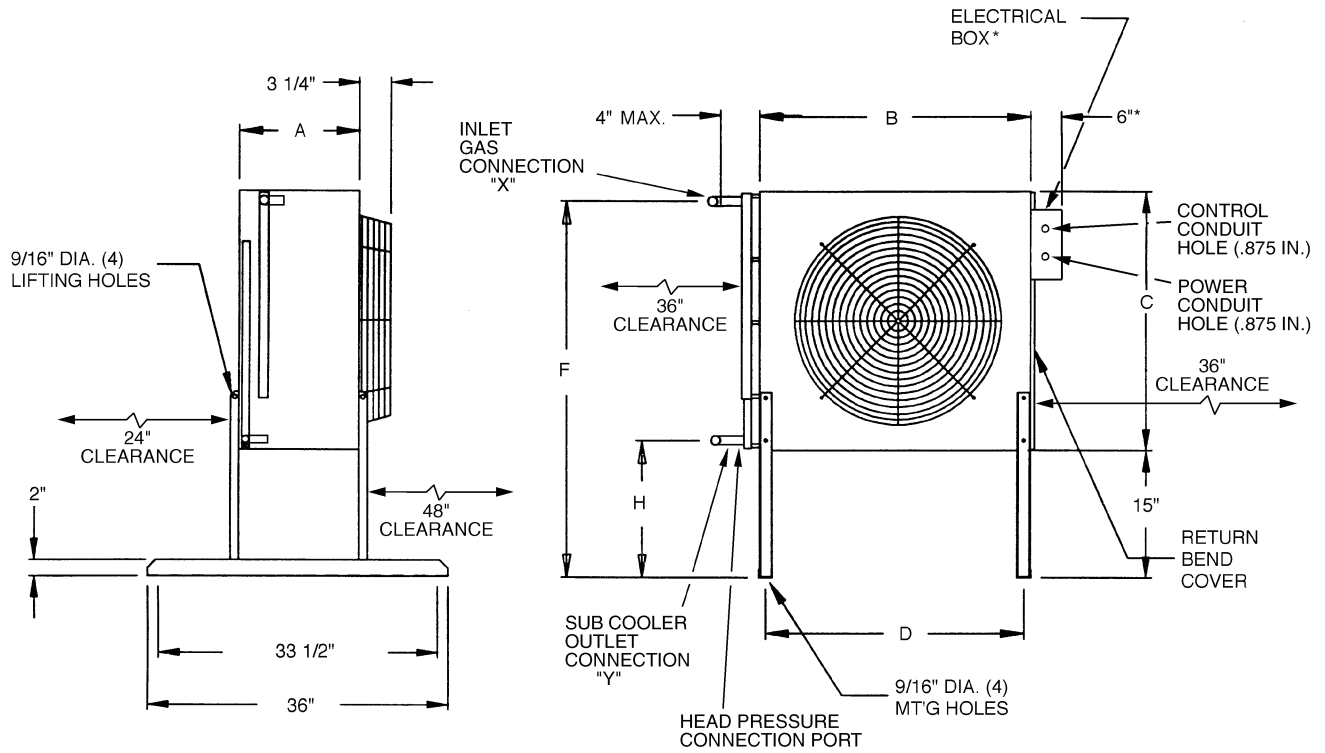
*Control box size varies depending on control options.

UNIT	FAN QUANTITY	TOTAL WEIGHT (lbs)	DIMENSIONS (in.)				
			Ckt 1		Ckt 2		
			A	B	A	B	
09AWH,09AWL	014	2	524	1 3/8	1 1/8	1 1/8	7/8
	016	2	537	1 3/8	1 1/8	1 1/8	7/8
	018	2	581	1 3/8	1 3/8	1 1/8	7/8
	024	2	597	1 3/8	1 3/8	1 1/8	7/8

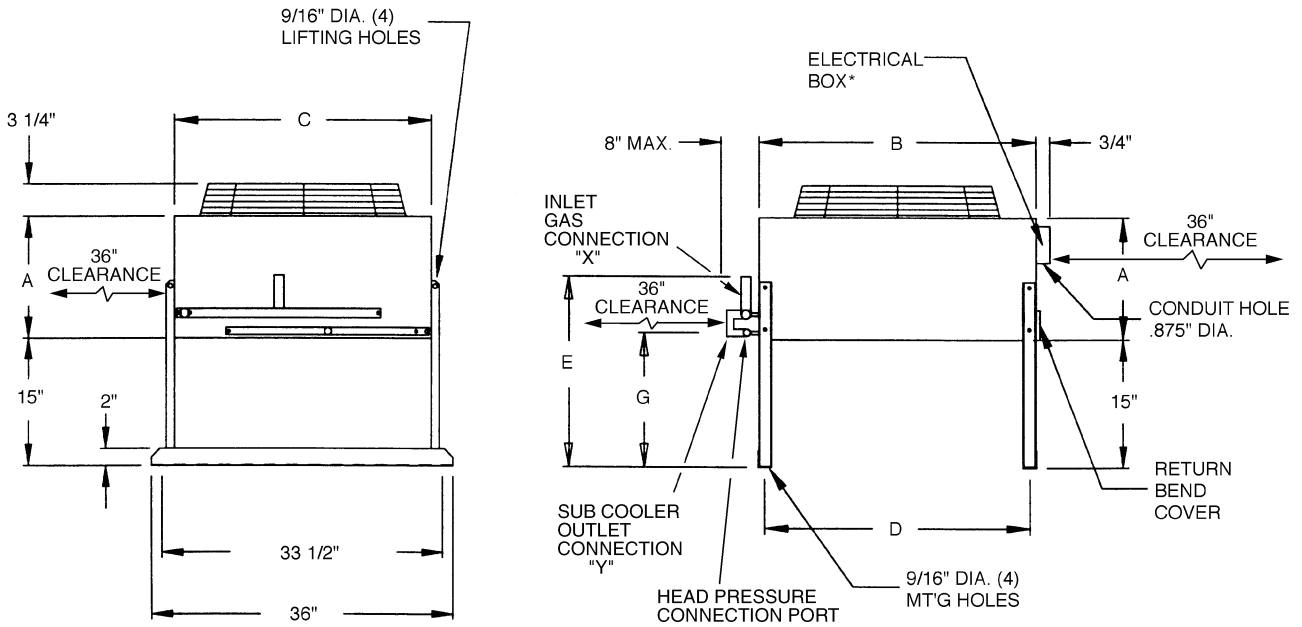
Base unit dimensions (cont)



**09AZH006
HORIZONTAL DISCHARGE**



VERTICAL DISCHARGE



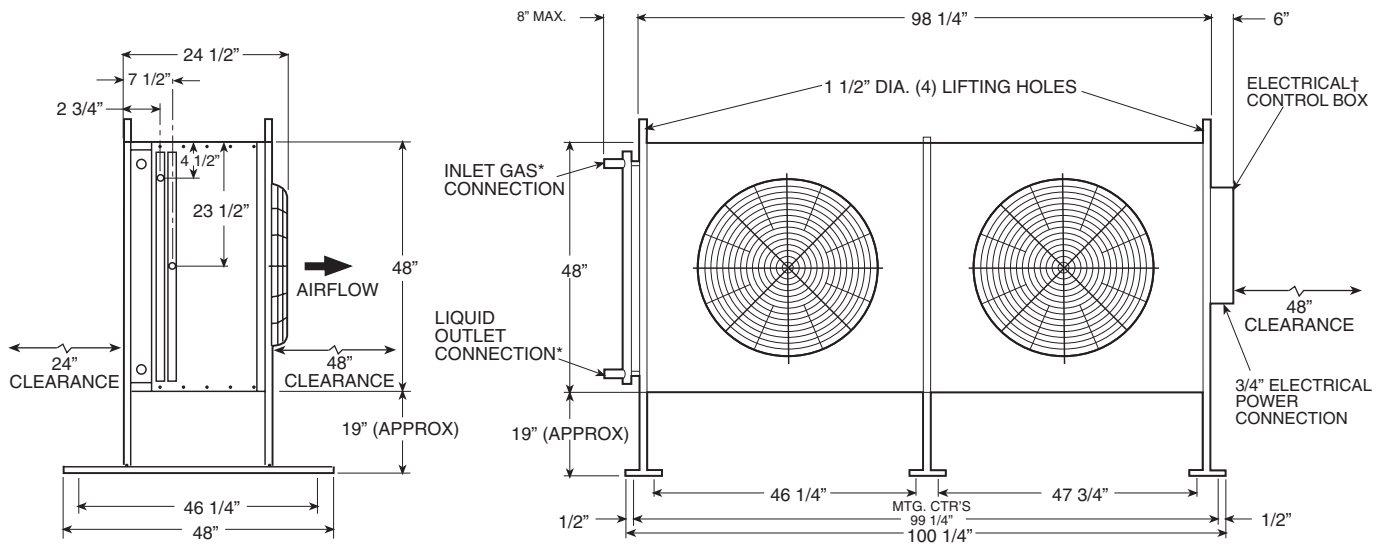
*Control box size varies depending on control options.

UNIT	FAN QUANTITY	TOTAL WEIGHT (lbs)	DIMENSIONS (in.)									
			A	B	C	D	E	F	G	H	X	Y
09AZH006	1	160	14 1/2	33	30 5/8	31 1/2	23 3/8	45	15	16 1/4	7/8	5/8

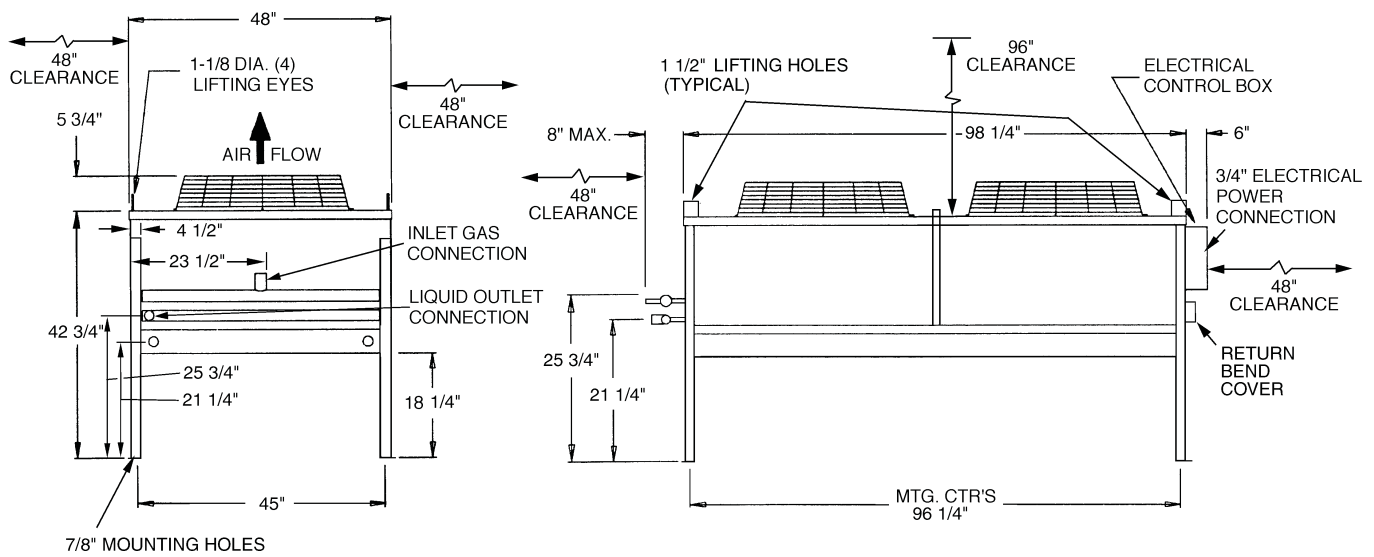
Base unit dimensions (cont)



09ZH008, 09AZL006,008 HORIZONTAL DISCHARGE



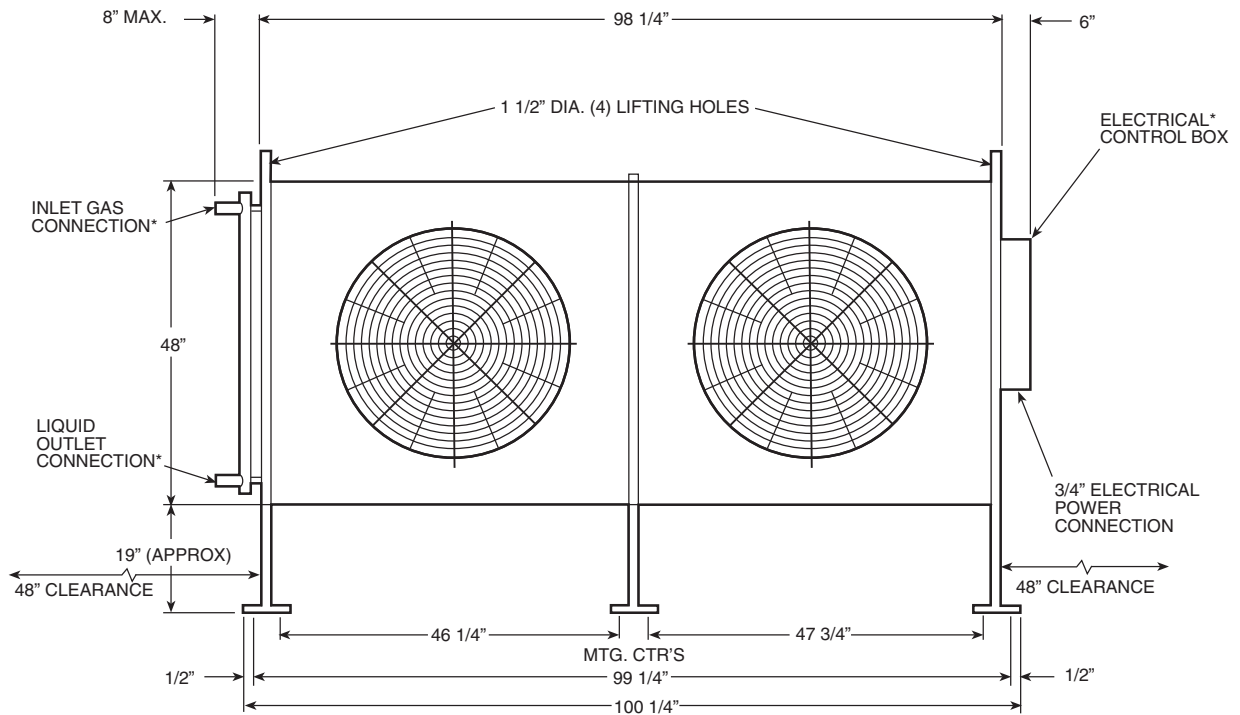
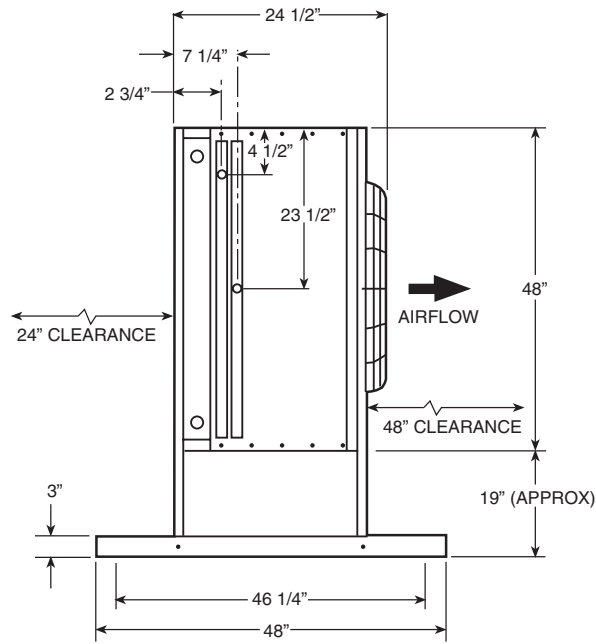
VERTICAL AIRFLOW



*Coil connection dimensions reflect single circuit units.
†Control box size varies depending on control options.

UNIT		FAN QUANTITY	TOTAL WEIGHT (lbs)
09AZH	008	2	259
09AZL	006	2	234
	008	2	259

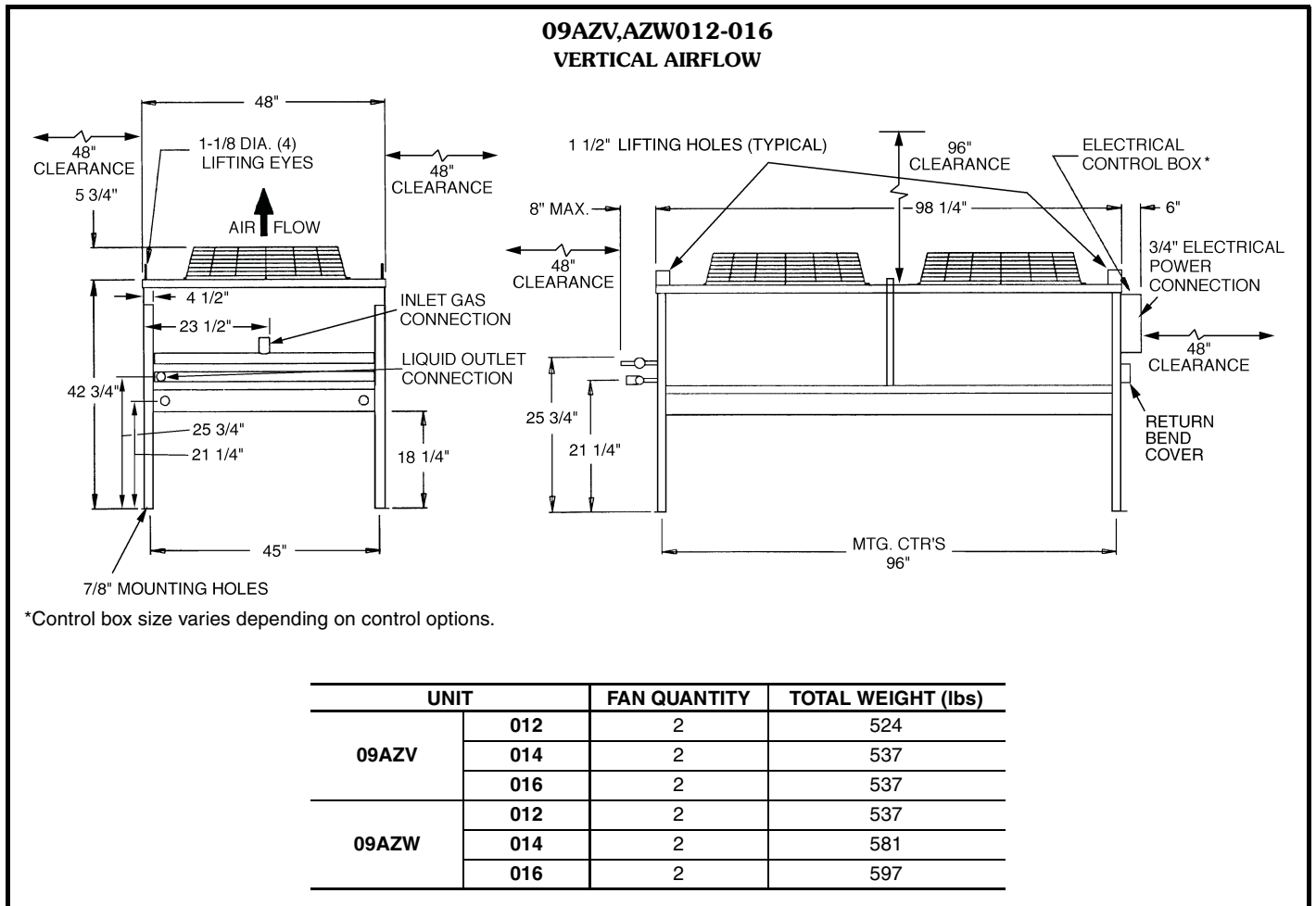
**09AZH,AZL012-016
HORIZONTAL DISCHARGE**



*Control box size varies depending on control options.

UNIT	FAN QUANTITY	TOTAL WEIGHT (lbs)
09AZH	012	2
	014	2
	016	2
09AZL	012	2
	014	2
	016	2

Base unit dimensions (cont)



UNIT	FAN QUANTITY	TOTAL WEIGHT (lbs)
09AZV	012	2
	014	2
	016	2
09AZW	012	2
	014	2
	016	2

Selection procedure (with example)



Condenser capacity ratings are based on the total heat of rejection (THR) of the system. THR is the sum of the net refrigerant effect and the heat of compression added to the refrigerant in the compressor.

The heat of compression varies with the compressor design, so it is best to use the compressor manufacturer's data whenever possible. If the compressor data is not available, the Capacity Multipliers tables below may be used to determine the heat of compression.

CAPACITY MULTIPLIERS (HERMETIC COMPRESSORS)

EVAP TEMP (°F)	CONDENSING TEMPERATURE (°F)								
	90	95	100	105	110	115	120	125	130
20	1.26	1.27	1.29	1.31	1.33	1.35	1.37	1.40	1.43
25	1.24	1.25	1.27	1.29	1.31	1.33	1.35	1.37	1.40
30	1.22	1.23	1.25	1.26	1.28	1.30	1.32	1.34	1.37
35	1.20	1.21	1.23	1.25	1.26	1.27	1.29	1.31	1.34
40	1.18	1.19	1.21	1.23	1.24	1.25	1.27	1.29	1.31
45	1.16	1.17	1.19	1.21	1.22	1.23	1.25	1.26	1.28
50	1.14	1.15	1.17	1.19	1.20	1.22	1.23	1.24	1.26

CAPACITY MULTIPLIERS (OPEN COMPRESSORS)

EVAP TEMP (°F)	CONDENSING TEMPERATURE (°F)								
	90	95	100	105	110	115	120	125	130
20	1.17	1.18	1.20	1.22	1.24	1.26	1.28	1.30	1.32
25	1.15	1.17	1.18	1.20	1.22	1.24	1.26	1.28	1.30
30	1.14	1.15	1.17	1.18	1.20	1.22	1.24	1.25	1.27
35	1.13	1.14	1.16	1.17	1.18	1.20	1.21	1.24	1.25
40	1.12	1.14	1.15	1.16	1.17	1.18	1.20	1.21	1.23
45	1.11	1.13	1.14	1.15	1.16	1.17	1.18	1.20	1.21
50	1.09	1.11	1.12	1.13	1.14	1.16	1.17	1.19	1.20

The following formulas may be used to calculate the THR for units outside the range of the tables.

For suction cooled hermetic compressors use:

$$\text{THR} = \text{Compressor Capacity (Btuh)} + (3413 \times \text{kW})$$

For open compressors use:

$$\text{THR} = \text{Compressor Capacity (Btuh)} + (2545 \times \text{brake horsepower})$$

I Determine design conditions.

When selecting a unit find the type of refrigerant, total heat rejection, and saturated discharge temperature (SDT) at the selected load conditions required by the compressor and evaporator.

Given:

Refrigerant R-22
 Entering-Air Temperature 95 F
 Required THR Per Circuit 72,000
 Saturated Discharge Temperature 125 F
 Discharge Line Loss 2° F
 (If Discharge Line Loss is unknown, use 2° F)

II Select unit based on requirements.

Determine the number of circuits required. Determine if optional subcooling circuit is needed. Determine if a low-sound motor is required.

Given:

Dual Circuits
 With Subcooler
 Standard Motor

III Determine saturated condensing temperature.

Saturated Condensing Temperature (SCT)
 = SCT - Line Loss
 = 125 F - 2 F = 123 F

IV Determine temperature difference (TD).

TD = SCT - Entering-Air Temperature
 = 123 F - 95 F = 28 F

V Enter Condenser Ratings table.

Based on temperature difference, refrigerant, subcooler, and dual circuit, select the unit which meets or exceeds the required heat rejection:

5 F subcooling selection, page 18 — By interpolation between 25 F and 30 F the 09AW012 will meet the requirements with 72,000 Btuh THR.

$$\text{Actual TD} = \frac{28 \text{ F} \times 72,000}{72,000} = 27.6 \text{ F}$$

15 F subcooling selection, page 19 — The 09AW012 will not meet the requirements, but by interpolation between 25 F and 30 F the 09AW014 will exceed the requirements with 89,700 Btuh THR.

$$\text{Actual TD} = \frac{28 \text{ F} \times 72,000}{89,700} = 22.5 \text{ F}$$

If the equations above are solved for subcooling rather than thaw TD (Temperature Difference) then:

The 09AW012 meets the required heat rejection at the selected TD with 7 F subcooling. The 09AW014 meets the required heat rejection with 10 F subcooling.

The actual operating point will depend on the balance of the indoor unit and the system refrigerant charge. Based on the balance point of heat rejection and capacity with the indoor unit, select the unit which best meets the system needs.

NOTE: Elevation above sea level has an effect on the performance of air cooled condensers. The unit capacities in the tables must be multiplied by the factors in the following table to compensate for various elevations.

ELEVATION (ft)	0	1000	2000	3000	4000	5000	6000	7000
FACTOR	1.0	0.98	0.96	0.93	0.91	0.89	0.87	0.85

Performance data



Condenser ratings

HEAT REJECTION (MBtuh)* (5 F Subcooling)

UNIT 09AWH, 09AWV	SUB- COOLER	CKTS	TEMPERATURE DIFFERENCE (TD) (F)															
			Refrigerant R-22								Refrigerant R-134a							
			5	10	15	20	25	30	35	40	5	10	15	20	25	30	35	40
001	No	1	3.30	6.70	10.10	13.50	16.80	20.20	23.60	27.00	3.14	6.37	9.60	12.83	15.96	19.19	22.42	25.65
	Yes	1	1.65	3.35	5.05	6.75	8.40	10.10	11.80	13.50	1.57	3.18	4.80	6.41	7.98	9.60	11.21	12.83
002	No	1	5.70	11.40	17.10	22.80	28.60	34.30	40.00	45.70	5.42	10.83	16.25	21.66	27.17	32.59	38.00	43.42
	No	2	2.85	5.70	8.55	11.40	14.30	17.15	20.00	22.85	2.71	5.42	8.12	10.83	13.59	16.29	19.00	21.71
	Yes	1	5.36	10.72	16.07	21.43	26.88	32.24	37.60	42.96	5.09	10.18	15.27	20.36	25.54	30.63	35.72	40.81
	Yes	2	2.68	5.36	8.04	10.72	13.44	16.12	18.80	21.48	2.55	5.09	7.64	10.18	12.77	15.31	17.86	20.41
003	No	1	9.30	18.50	27.70	36.90	46.20	55.40	64.60	73.80	8.84	17.58	26.32	35.06	43.89	52.63	61.37	70.11
	No	2	4.65	9.25	13.85	18.45	23.10	27.70	32.30	36.90	4.42	8.79	13.16	17.53	21.95	26.32	30.69	35.06
	Yes	1	8.74	17.39	26.04	34.69	43.43	52.08	60.72	69.37	8.30	16.52	24.74	32.95	41.26	49.47	57.69	65.90
	Yes	2	4.37	8.70	13.02	17.34	21.71	26.04	30.36	34.69	4.15	8.26	12.37	16.48	20.63	24.74	28.84	32.95
004	No	1	13.10	24.70	36.30	48.30	60.50	72.50	84.50	96.50	12.45	23.47	34.49	45.89	57.48	68.88	80.28	91.68
	No	2	6.55	12.35	18.15	24.15	30.25	36.25	42.25	48.25	6.22	11.73	17.24	22.94	28.74	34.44	40.14	45.84
	Yes	1	12.31	23.22	34.12	45.40	56.87	68.15	79.43	90.71	11.70	22.06	32.42	43.13	54.03	64.74	75.46	86.17
	Yes	2	6.16	11.61	17.06	22.70	28.44	34.08	39.72	45.36	5.85	11.03	16.21	21.57	27.01	32.37	37.73	43.09
006	No	1	18.30	36.80	55.30	73.60	92.10	110.50	128.90	147.30	17.39	34.96	52.54	69.92	87.50	104.98	122.46	139.94
	No	2	9.15	18.40	27.65	36.80	46.05	55.25	64.45	73.65	8.69	17.48	26.27	34.96	43.75	52.49	61.23	69.97
	Yes	1	17.20	34.59	51.98	69.18	86.57	103.87	121.17	138.46	16.34	32.86	49.38	65.72	82.25	98.68	115.11	131.54
	Yes	2	8.60	17.30	25.99	34.59	43.29	51.94	60.58	69.23	8.17	16.43	24.69	32.86	41.12	49.34	57.55	65.77
008	No	1	24.10	48.30	72.50	96.70	120.90	145.00	169.10	193.20	22.90	45.89	68.88	91.87	114.86	137.75	160.65	183.54
	No	2	12.05	24.15	36.25	48.35	60.45	72.50	84.55	96.60	11.45	22.94	34.44	45.93	57.43	68.88	80.32	91.77
	Yes	1	22.65	45.40	68.15	90.90	113.65	136.30	158.95	181.61	21.52	43.13	64.74	86.35	107.96	129.49	151.01	172.53
	Yes	2	11.33	22.70	34.08	45.45	56.82	68.15	79.48	90.80	10.76	21.57	32.37	43.18	53.98	64.74	75.50	86.26
012	No	1	27.70	55.40	83.10	110.80	138.50	166.20	193.90	221.60	26.32	52.63	78.95	105.26	131.58	157.89	184.21	210.52
	No	2	13.85	27.70	41.55	55.40	69.25	83.10	96.95	110.80	13.16	26.32	39.47	52.63	65.79	78.95	92.10	105.26
	Yes	1	26.04	52.08	78.11	104.15	130.19	156.23	182.27	208.30	24.74	49.47	74.21	98.94	123.68	148.42	173.15	197.89
	Yes	2	13.02	26.04	39.06	52.08	65.10	78.11	91.13	104.15	12.37	24.74	37.10	49.47	61.84	74.21	86.58	98.94
014	No	1	36.30	72.50	108.70	144.80	181.00	217.30	253.60	289.90	34.49	68.88	103.27	137.56	171.95	206.44	240.92	275.41
	No	2	18.15	36.25	54.35	72.40	90.50	108.65	126.80	144.95	17.24	34.44	51.63	68.78	85.98	103.22	120.46	137.70
	Yes	1	34.12	68.15	102.18	136.11	170.14	204.26	238.38	272.51	32.42	64.74	97.07	129.31	161.63	194.05	226.46	258.88
	Yes	2	17.06	34.08	51.09	68.06	85.07	102.13	119.19	136.25	16.21	32.37	48.53	64.65	80.82	97.02	113.23	129.44
016	No	1	40.40	80.90	121.40	161.80	202.20	242.70	283.20	323.70	38.38	76.86	115.33	153.71	192.09	230.57	269.04	307.52
	No	2	20.20	40.45	60.70	80.90	101.10	121.35	141.60	161.85	19.19	38.43	57.67	76.86	96.05	115.28	134.52	153.76
	Yes	1	37.98	76.05	114.12	152.09	190.07	228.14	266.21	304.28	36.08	72.24	108.41	144.49	180.56	216.73	252.90	289.06
	Yes	2	18.99	38.02	57.06	76.05	95.03	114.07	133.10	152.14	18.04	36.12	54.21	72.24	90.28	108.37	126.45	144.53
018	No	1	48.40	96.70	145.00	193.40	241.70	290.00	338.30	386.60	45.98	91.87	137.75	183.73	229.62	275.50	321.39	367.27
	No	2	24.20	48.35	72.50	96.70	120.85	145.00	169.15	193.30	22.99	45.93	68.88	91.87	114.81	137.75	160.69	183.64
	Yes	1	45.50	90.90	136.30	181.80	227.20	272.60	318.00	363.40	43.22	86.35	129.49	172.71	215.84	258.97	302.10	345.23
	Yes	2	22.75	45.45	68.15	90.90	113.60	136.30	159.00	181.70	21.61	43.18	64.74	86.35	107.92	129.49	151.05	172.62
020	No	1	53.00	105.90	158.80	211.80	264.70	317.60	370.50	423.40	50.35	100.61	150.86	201.21	251.47	301.72	351.98	402.23
	No	2	26.50	52.95	79.40	105.90	132.35	158.80	185.25	211.70	25.18	50.30	75.43	100.61	125.73	150.86	175.99	201.12
	Yes	1	49.82	99.55	149.27	199.09	248.82	298.54	348.27	398.00	47.33	94.57	141.81	189.14	236.38	283.62	330.86	378.10
	Yes	2	24.91	49.77	74.64	99.55	124.41	149.27	174.14	199.00	23.66	47.28	70.90	94.57	118.19	141.81	165.43	189.05

*Per circuit.



HEAT REJECTION (MBtuh)* (15 F Subcooling)

UNIT 09AWH, 09AWV	SUB- COOLER	CKTS	TEMPERATURE DIFFERENCE (TD) (F)															
			Refrigerant R-22								Refrigerant R-134a							
			5	10	15	20	25	30	35	40	5	10	15	20	25	30	35	40
001	No	1	N/A	N/A	9.51	12.70	15.81	19.01	22.21	25.41	2.95	5.99	9.03	12.07	15.02	18.06	21.10	24.14
	Yes	1	N/A	N/A	4.75	6.35	7.91	9.51	11.10	12.70	1.48	3.00	4.51	6.03	7.51	9.03	10.55	12.07
002	No	1	N/A	N/A	16.09	21.46	26.92	32.28	37.64	43.01	5.10	10.19	15.29	20.38	25.57	30.67	35.76	40.86
	No	2	N/A	N/A	8.05	10.73	13.46	16.14	18.82	21.50	2.55	5.10	7.64	10.19	12.78	15.33	17.88	20.43
	Yes	1	N/A	N/A	15.13	20.17	25.30	30.34	35.39	40.43	4.79	9.58	14.37	19.16	24.04	28.83	33.62	38.41
	Yes	2	N/A	N/A	7.56	10.08	12.65	15.17	17.69	20.21	2.40	4.79	7.19	9.58	12.02	14.41	16.81	19.20
003	No	1	N/A	N/A	26.07	34.73	43.48	52.14	60.80	69.45	8.31	16.54	24.77	32.99	41.30	49.53	57.76	65.98
	No	2	N/A	N/A	13.03	17.36	21.74	26.07	30.40	34.73	4.16	8.27	12.38	16.50	20.65	24.77	28.88	32.99
	Yes	1	N/A	N/A	24.50	32.64	40.87	49.01	57.15	65.29	7.82	15.55	23.28	31.01	38.83	46.56	54.29	62.02
	Yes	2	N/A	N/A	12.25	16.32	20.44	24.50	28.57	32.64	3.91	7.77	11.64	15.51	19.41	23.28	27.14	31.01
004	No	1	N/A	N/A	34.16	45.46	56.94	68.23	79.52	90.82	11.71	22.08	32.45	43.18	54.09	64.82	75.55	86.28
	No	2	N/A	N/A	17.08	22.73	28.47	34.11	39.76	45.41	5.86	11.04	16.23	21.59	27.04	32.41	37.77	43.14
	Yes	1	N/A	N/A	32.11	42.73	53.52	64.14	74.75	85.37	11.01	20.76	30.51	40.59	50.84	60.93	71.01	81.10
	Yes	2	N/A	N/A	16.06	21.36	26.76	32.07	37.38	42.68	5.50	10.38	15.25	20.30	25.42	30.46	35.51	40.55
006	No	1	N/A	N/A	52.04	69.26	86.68	103.99	121.31	138.62	16.36	32.90	49.44	65.80	82.34	98.79	115.24	131.69
	No	2	N/A	N/A	26.02	34.63	43.34	52.00	60.65	69.31	8.18	16.45	24.72	32.90	41.17	49.40	57.62	65.85
	Yes	1	N/A	N/A	48.92	65.11	81.47	97.75	114.03	130.31	15.38	30.93	46.47	61.85	77.40	92.86	108.33	123.79
	Yes	2	N/A	N/A	24.46	32.55	40.74	48.88	57.01	65.15	7.69	15.46	23.24	30.93	38.70	46.43	54.16	61.90
008	No	1	N/A	N/A	68.23	91.00	113.78	136.46	159.14	181.82	21.55	43.18	64.82	86.45	108.09	129.64	151.18	172.73
	No	2	N/A	N/A	34.11	45.50	56.89	68.23	79.57	90.91	10.77	21.59	32.41	43.23	54.05	64.82	75.59	86.36
	Yes	1	N/A	N/A	64.14	85.54	106.95	128.27	149.59	170.91	20.25	40.59	60.93	81.27	101.60	121.86	142.11	162.37
	Yes	2	N/A	N/A	32.07	42.77	53.48	64.14	74.80	85.46	10.13	20.30	30.46	40.63	50.80	60.93	71.06	81.18
012	No	1	N/A	N/A	78.21	104.27	130.34	156.41	182.48	208.55	24.77	49.53	74.30	99.06	123.83	148.59	173.36	198.12
	No	2	N/A	N/A	39.10	52.14	65.17	78.21	91.24	104.27	12.38	24.77	37.15	49.53	61.91	74.30	86.68	99.06
	Yes	1	N/A	N/A	73.51	98.02	122.52	147.03	171.53	196.03	23.28	46.56	69.84	93.12	116.40	139.67	162.95	188.23
	Yes	2	N/A	N/A	36.76	49.01	61.26	73.51	85.77	98.02	11.64	23.28	34.92	46.56	58.20	69.84	81.48	93.12
014	No	1	N/A	N/A	102.30	136.27	170.34	204.50	238.66	272.82	32.45	64.82	97.18	129.46	161.82	194.28	226.73	259.18
	No	2	N/A	N/A	51.15	68.14	85.17	102.25	119.33	136.41	16.23	32.41	48.59	64.73	80.91	97.14	113.36	129.59
	Yes	1	N/A	N/A	96.16	128.10	160.12	192.23	224.34	256.46	30.51	60.93	91.35	121.69	152.11	182.62	213.13	243.63
	Yes	2	N/A	N/A	48.08	64.05	80.06	96.12	112.17	128.23	15.25	30.46	45.68	60.85	76.06	91.31	106.56	121.82
016	No	1	N/A	N/A	114.25	152.27	190.29	228.40	266.52	304.63	36.12	72.33	108.54	144.66	180.78	216.98	253.19	289.40
	No	2	N/A	N/A	57.12	76.13	95.15	114.20	133.26	152.32	18.06	36.16	54.27	72.33	90.39	108.49	126.60	144.70
	Yes	1	N/A	N/A	107.39	143.13	178.87	214.70	250.53	286.36	33.95	67.99	102.02	135.98	169.93	203.97	238.00	272.04
	Yes	2	N/A	N/A	53.70	71.57	89.44	107.35	125.26	143.18	16.98	33.99	51.01	67.99	84.96	101.98	119.00	136.02
018	No	1	N/A	N/A	136.46	182.01	227.46	272.92	318.37	363.83	43.27	86.45	129.64	172.91	216.09	259.27	302.46	345.64
	No	2	N/A	N/A	68.23	91.00	113.73	136.46	159.19	181.91	21.64	43.23	64.82	86.45	108.05	129.64	151.23	172.82
	Yes	1	N/A	N/A	128.27	171.09	213.82	256.54	299.27	342.00	40.68	81.27	121.86	162.53	203.13	243.72	284.31	324.90
	Yes	2	N/A	N/A	64.14	85.54	106.91	128.27	149.64	171.00	20.34	40.63	60.93	81.27	101.56	121.86	142.15	162.45
020	No	1	N/A	N/A	149.45	199.32	249.11	298.89	348.68	398.46	47.38	94.68	141.97	189.36	236.65	283.95	331.24	378.54
	No	2	N/A	N/A	74.72	99.66	124.55	149.45	174.34	199.23	23.69	47.34	70.99	94.68	118.33	141.97	165.62	189.27
	Yes	1	N/A	N/A	140.48	187.37	234.16	280.96	327.76	374.55	44.54	89.00	133.46	178.00	222.45	266.91	311.37	355.83
	Yes	2	N/A	N/A	70.24	93.68	117.08	140.48	163.88	187.28	22.27	44.50	66.73	89.00	111.23	133.46	155.68	177.91

*Per circuit.

Performance data (cont)



Condenser ratings (cont)

HEAT REJECTION (MBtuh)* (5 F Subcooling)

UNIT 09AWL, 09AWW	SUB- COOLER	CKTS	TEMPERATURE DIFFERENCE (TD) (F)															
			Refrigerant R-22								Refrigerant R-134a							
			5	10	15	20	25	30	35	40	5	10	15	20	25	30	35	40
001	No	1	3.20	6.40	9.60	12.70	15.90	19.10	22.30	25.50	3.04	6.08	9.12	12.07	15.11	18.15	21.19	24.23
	Yes	1	1.60	3.20	4.80	6.35	7.95	9.55	11.15	12.75	1.52	3.04	4.56	6.03	7.55	9.07	10.59	12.11
002	No	1	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	4.75	9.50	14.25	19.00	23.75	28.50	33.25	38.00
	No	2	2.50	5.00	7.50	10.00	12.50	15.00	17.50	20.00	2.38	4.75	7.13	9.50	11.88	14.25	16.63	19.00
	Yes	1	4.70	9.40	14.10	18.80	23.50	28.20	32.90	37.60	4.47	8.93	13.40	17.86	22.33	26.79	31.26	35.72
	Yes	2	2.35	4.70	7.05	9.40	11.75	14.10	16.45	18.80	2.23	4.47	6.70	8.93	11.16	13.40	15.63	17.86
003	No	1	7.90	15.70	23.50	31.30	39.20	47.00	54.80	62.60	7.51	14.92	22.33	29.74	37.24	44.65	52.06	59.47
	No	2	3.95	7.85	11.75	15.65	19.60	23.50	27.40	31.30	3.75	7.46	11.16	14.87	18.62	22.33	26.03	29.74
	Yes	1	7.43	14.76	22.09	29.42	36.85	44.18	51.51	58.84	7.05	14.02	20.99	27.95	35.01	41.97	48.94	55.90
	Yes	2	3.71	7.38	11.05	14.71	18.42	22.09	25.76	29.42	3.53	7.01	10.49	13.98	17.50	20.99	24.47	27.95
004	No	1	10.10	20.20	30.30	40.30	50.40	60.50	70.60	80.70	9.60	19.19	28.79	38.29	47.88	57.48	67.07	76.67
	No	2	5.05	10.10	15.10	20.15	25.20	30.25	35.30	40.35	4.80	9.60	14.39	19.14	23.94	28.74	33.54	38.33
	Yes	1	9.49	18.99	28.48	37.88	47.38	56.87	66.36	75.86	9.02	18.04	27.06	35.99	45.01	54.03	63.05	72.07
	Yes	2	4.75	9.49	14.24	18.94	23.69	28.44	33.18	37.93	4.51	9.02	13.53	17.99	22.50	27.01	31.52	36.03
006	No	1	15.50	31.20	46.90	62.50	78.10	93.70	109.30	124.90	14.73	29.64	44.56	59.38	74.20	89.02	103.84	118.66
	No	2	7.75	15.60	23.45	31.25	39.05	46.85	54.65	62.45	7.36	14.82	22.28	29.69	37.10	44.51	51.92	59.33
	Yes	1	14.57	29.33	44.09	58.75	73.41	88.08	102.74	117.41	13.84	27.86	41.88	55.81	69.74	83.67	97.60	111.54
	Yes	2	7.29	14.66	22.04	29.38	36.71	44.04	51.37	58.70	6.92	13.93	20.94	27.91	34.87	41.84	48.80	55.77
008	No	1	20.20	40.40	60.60	80.70	100.90	121.10	141.30	161.50	19.19	38.38	57.57	76.67	95.86	115.05	134.24	153.43
	No	2	10.10	20.20	30.30	40.35	50.45	60.55	70.65	80.75	9.60	19.19	28.79	38.33	47.93	57.52	67.12	76.71
	Yes	1	18.99	37.98	56.96	75.86	94.85	113.83	132.82	151.81	18.04	36.08	54.12	72.07	90.10	108.14	126.18	144.22
	Yes	2	9.49	18.99	28.48	37.93	47.42	56.92	66.41	75.91	9.02	18.04	27.06	36.03	45.05	54.07	63.09	72.11
012	No	1	22.10	44.40	66.70	88.90	111.10	133.30	155.50	177.70	21.00	42.18	63.37	84.46	105.55	126.64	147.73	168.82
	No	2	11.05	22.20	33.35	44.45	55.55	66.65	77.75	88.85	10.50	21.09	31.68	42.23	52.77	63.32	73.86	84.41
	Yes	1	20.77	41.74	62.70	83.57	104.43	125.30	146.17	167.04	19.74	39.65	59.56	79.39	99.21	119.04	138.86	158.69
	Yes	2	10.39	20.87	31.35	41.78	52.22	62.65	73.09	83.52	9.87	19.82	29.78	39.69	49.61	59.52	69.43	79.34
014	No	1	31.60	63.30	95.00	126.60	158.30	189.90	221.50	253.10	30.02	60.14	90.25	120.27	150.39	180.41	210.43	240.45
	No	2	15.80	31.65	47.50	63.30	79.15	94.95	110.75	126.55	15.01	30.07	45.13	60.14	75.19	90.20	105.21	120.22
	Yes	1	29.70	59.50	89.30	119.00	148.80	178.51	208.21	237.91	28.22	56.53	84.84	113.05	141.36	169.58	197.80	226.02
	Yes	2	14.85	29.75	44.65	59.50	74.40	89.25	104.11	118.96	14.11	28.26	42.42	56.53	70.68	84.79	98.90	113.01
016	No	1	34.30	68.60	102.90	137.20	171.50	205.80	240.10	274.40	32.59	65.17	97.76	130.34	162.93	195.51	228.10	260.68
	No	2	17.15	34.30	51.45	68.60	85.75	102.90	120.05	137.20	16.29	32.59	48.88	65.17	81.46	97.76	114.05	130.34
	Yes	1	32.24	64.48	96.73	128.97	161.21	193.45	225.69	257.94	30.63	61.26	91.89	122.52	153.15	183.78	214.41	245.04
	Yes	2	16.12	32.24	48.36	64.48	80.61	96.73	112.85	128.97	15.31	30.63	45.94	61.26	76.57	91.89	107.20	122.52
018	No	1	41.10	82.10	123.10	164.10	205.20	246.20	287.20	328.20	39.05	78.00	116.95	155.90	194.94	233.89	272.84	311.79
	No	2	20.55	41.05	61.55	82.05	102.60	123.10	143.60	164.10	19.52	39.00	58.47	77.95	97.47	116.95	136.42	155.90
	Yes	1	38.63	77.17	115.71	154.25	192.89	231.43	269.97	308.51	36.70	73.32	109.93	146.54	183.24	219.86	256.47	293.08
	Yes	2	19.32	38.59	57.86	77.13	96.44	115.71	134.98	154.25	18.35	36.66	54.96	73.27	91.62	109.93	128.23	146.54
020	No	1	44.20	88.40	132.60	176.80	221.00	265.20	309.40	353.60	41.99	83.98	125.97	167.96	209.95	251.94	293.93	335.92
	No	2	22.10	44.20	66.30	88.40	110.50	132.60	154.70	176.80	21.00	41.99	62.99	83.98	104.98	125.97	146.97	167.96
	Yes	1	41.55	83.10	124.64	166.19	207.74	249.29	290.84	332.38	39.47	78.94	118.41	157.88	197.35	236.82	276.29	315.76
	Yes	2	20.77	41.55	62.32	83.10	103.87	124.64	145.42	166.19	19.74	39.47	59.21	78.94	98.68	118.41	138.15	157.88

*Per circuit.



HEAT REJECTION (MBtuh)* (15 F Subcooling)

UNIT 09AWL, 09AWW	SUB- COOLER	CKTS	TEMPERATURE DIFFERENCE (TD) (F)															
			Refrigerant R-22								Refrigerant R-134a							
			5	10	15	20	25	30	35	40	5	10	15	20	25	30	35	40
001	No	1	N/A	N/A	9.03	11.95	14.96	17.98	20.99	24.00	2.86	5.72	8.58	11.35	14.22	17.08	19.94	22.80
	Yes	1	N/A	N/A	4.52	5.98	7.48	8.99	10.49	12.00	1.43	2.86	4.29	5.68	7.11	8.54	9.97	11.40
002	No	1	N/A	N/A	14.12	18.82	23.53	28.23	32.94	37.64	4.47	8.94	13.41	17.88	22.35	26.82	31.29	35.76
	No	2	N/A	N/A	7.06	9.41	11.76	14.12	16.47	18.82	2.24	4.47	6.71	8.94	11.18	13.41	15.65	17.88
	Yes	1	N/A	N/A	13.27	17.69	22.12	26.54	30.96	35.39	4.20	8.40	12.61	16.81	21.01	25.21	29.41	33.62
	Yes	2	N/A	N/A	6.63	8.85	11.06	13.27	15.48	17.69	2.10	4.20	6.30	8.40	10.51	12.61	14.71	16.81
003	No	1	N/A	N/A	22.12	29.46	36.89	44.23	51.57	58.91	7.06	14.04	21.01	27.98	35.05	42.02	48.99	55.97
	No	2	N/A	N/A	11.06	14.73	18.45	22.12	25.79	29.46	3.53	7.02	10.51	13.99	17.52	21.01	24.50	27.98
	Yes	1	N/A	N/A	20.79	27.69	34.68	41.58	48.48	55.38	6.64	13.19	19.75	26.30	32.94	39.50	46.05	52.61
	Yes	2	N/A	N/A	10.39	13.84	17.34	20.79	24.24	27.69	3.32	6.60	9.87	13.15	16.47	19.75	23.03	26.30
004	No	1	N/A	N/A	28.52	37.93	47.43	56.94	66.44	75.95	9.03	18.06	27.09	36.03	45.06	54.09	63.12	72.15
	No	2	N/A	N/A	14.26	18.96	23.72	28.47	33.22	37.97	4.51	9.03	13.54	18.02	22.53	27.04	31.56	36.07
	Yes	1	N/A	N/A	26.80	35.65	44.59	53.52	62.46	71.39	8.49	16.98	25.46	33.87	42.36	50.84	59.33	67.82
	Yes	2	N/A	N/A	13.40	17.83	22.29	26.76	31.23	35.69	4.24	8.49	12.73	16.93	21.18	25.42	29.67	33.91
006	No	1	N/A	N/A	44.14	58.82	73.50	88.18	102.86	117.54	13.86	27.89	41.93	55.88	69.82	83.77	97.72	111.67
	No	2	N/A	N/A	22.07	29.41	36.75	44.09	51.43	58.77	6.93	13.95	20.97	27.94	34.91	41.89	48.86	55.83
	Yes	1	N/A	N/A	41.49	55.29	69.09	82.89	96.69	110.49	13.03	26.22	39.41	52.53	65.64	78.75	91.86	104.97
	Yes	2	N/A	N/A	20.74	27.64	34.54	41.45	48.35	55.25	6.51	13.11	19.71	26.26	32.82	39.37	45.93	52.48
008	No	1	N/A	N/A	57.03	75.95	94.96	113.97	132.98	151.99	18.06	36.12	54.18	72.15	90.21	108.27	126.33	144.39
	No	2	N/A	N/A	28.52	37.97	47.48	56.98	66.49	75.99	9.03	18.06	27.09	36.07	45.10	54.13	63.16	72.19
	Yes	1	N/A	N/A	53.61	71.39	89.26	107.13	125.00	142.87	16.98	33.95	50.93	67.82	84.80	101.77	118.75	135.72
	Yes	2	N/A	N/A	26.80	35.69	44.63	53.56	62.50	71.43	8.49	16.98	25.46	33.91	42.40	50.89	59.37	67.86
012	No	1	N/A	N/A	62.77	83.66	104.56	125.45	146.34	167.23	19.76	39.70	59.63	79.48	99.33	119.18	139.02	158.87
	No	2	N/A	N/A	31.39	41.83	52.28	62.72	73.17	83.62	9.88	19.85	29.82	39.74	49.66	59.59	69.51	79.44
	Yes	1	N/A	N/A	59.01	78.64	98.28	117.92	137.56	157.20	18.57	37.31	56.05	74.71	93.37	112.03	130.68	149.34
	Yes	2	N/A	N/A	29.50	39.32	49.14	58.96	68.78	78.60	9.29	18.66	28.03	37.36	46.68	56.01	65.34	74.67
014	No	1	N/A	N/A	89.40	119.14	148.98	178.71	208.45	238.19	28.25	56.59	84.93	113.19	141.53	169.78	198.03	226.28
	No	2	N/A	N/A	44.70	59.57	74.49	89.36	104.23	119.10	14.13	28.30	42.47	56.59	70.76	84.89	99.02	113.14
	Yes	1	N/A	N/A	84.04	111.99	140.04	167.99	195.95	223.90	26.56	53.20	79.84	106.39	133.04	159.59	186.15	212.71
	Yes	2	N/A	N/A	42.02	56.00	70.02	84.00	97.97	111.95	13.28	26.60	39.92	53.20	66.52	79.80	93.07	106.35
016	No	1	N/A	N/A	96.84	129.12	161.40	193.68	225.96	258.24	30.67	61.33	92.00	122.66	153.33	183.99	214.66	245.33
	No	2	N/A	N/A	48.42	64.56	80.70	96.84	112.98	129.12	15.33	30.67	46.00	61.33	76.66	92.00	107.33	122.66
	Yes	1	N/A	N/A	91.03	121.37	151.71	182.06	212.40	242.74	28.83	57.65	86.48	115.30	144.13	172.95	201.78	230.61
	Yes	2	N/A	N/A	45.51	60.69	75.86	91.03	106.20	121.37	14.41	28.83	43.24	57.65	72.06	86.48	100.89	115.30
018	No	1	N/A	N/A	115.85	154.43	193.11	231.70	270.28	308.87	36.75	73.40	110.06	146.71	183.46	220.11	256.77	293.43
	No	2	N/A	N/A	57.92	77.22	96.56	115.85	135.14	154.43	18.37	36.70	55.03	73.36	91.73	110.06	128.38	146.71
	Yes	1	N/A	N/A	108.90	145.17	181.53	217.80	254.07	290.34	34.54	69.00	103.45	137.91	172.45	206.91	241.36	275.82
	Yes	2	N/A	N/A	54.45	72.58	90.76	108.90	127.03	145.17	17.27	34.50	51.73	68.96	86.23	103.45	120.68	137.91
020	No	1	N/A	N/A	124.79	166.39	207.98	249.58	291.18	332.77	39.52	79.03	118.55	158.07	197.58	237.10	276.62	316.13
	No	2	N/A	N/A	62.39	83.19	103.99	124.79	145.59	166.39	19.76	39.52	59.28	79.03	98.79	118.55	138.31	158.07
	Yes	1	N/A	N/A	117.30	156.40	195.50	234.60	273.71	312.81	37.15	74.29	111.44	148.58	185.73	222.87	260.02	297.17
	Yes	2	N/A	N/A	58.65	78.20	97.75	117.30	136.85	156.40	18.57	37.15	55.72	74.29	92.86	111.44	130.01	148.58

*Per circuit.

Performance data (cont)



Condenser ratings (cont)

HEAT REJECTION (MBtuh)* (5 F Subcooling)

UNIT 09AZH, 09AZV	SUB- COOLER	CKTS	TEMPERATURE DIFFERENCE (TD) (F)															
			Refrigerant R-22								Refrigerant R-134a							
			5	10	15	20	25	30	35	40	5	10	15	20	25	30	35	40
006	Yes	1	13.68	25.79	37.90	50.43	63.17	75.70	88.23	100.76	12.99	24.50	36.01	47.91	60.01	71.92	83.8	95.72
008	Yes	1	22.23	44.54	66.86	89.18	111.50	133.73	155.95	178.18	21.11	42.32	63.52	84.72	105.93	127.04	127.04	169.27
012	Yes	2	27.70	55.40	83.10	110.80	138.50	166.20	193.90	221.60	26.32	52.63	78.95	105.26	131.57	157.88	184.19	210.50
014	Yes	2	36.78	73.66	110.53	147.41	184.29	221.17	258.05	294.93	34.94	69.98	105.01	139.95	174.90	209.93	244.96	279.99
016	Yes	2	42.64	85.38	128.12	170.86	213.60	256.34	299.08	341.82	40.51	81.11	121.72	162.22	202.73	243.34	283.94	324.55

HEAT REJECTION (MBtuh)* (15 F Subcooling)

UNIT 09AZH, 09AZV	SUB- COOLER	CKTS	TEMPERATURE DIFFERENCE (TD) (F)															
			Refrigerant R-22								Refrigerant R-134a							
			5	10	15	20	25	30	35	40	5	10	15	20	25	30	35	40
006	Yes	1	N/A	N/A	35.67	47.46	59.25	71.04	82.83	94.62	12.23	23.06	33.89	45.09	56.48	67.68	78.88	90.08
008	Yes	1	N/A	N/A	62.92	83.93	104.93	125.93	146.93	167.93	19.87	39.82	59.78	79.73	99.69	119.56	139.4	159.30
012	Yes	2	N/A	N/A	78.21	115.62	153.03	190.44	227.85	265.26	24.77	49.53	74.30	99.06	123.82	148.59	173.35	198.11
014	Yes	2	N/A	N/A	104.02	151.43	198.84	246.25	293.66	341.07	32.89	65.85	98.82	131.71	164.59	197.56	230.53	263.50
016	Yes	2	N/A	N/A	120.58	177.99	235.40	292.81	350.22	407.63	38.12	76.33	114.55	152.67	190.79	229.00	267.22	305.43

HEAT REJECTION (MBtuh)* (5 F Subcooling)

UNIT 09AZL, 09AZW	SUB- COOLER	CKTS	TEMPERATURE DIFFERENCE (TD) (F)															
			Refrigerant R-22								Refrigerant R-134a							
			5	10	15	20	25	30	35	40	5	10	15	20	25	30	35	40
006	Yes	1	12.67	25.51	38.34	51.09	63.85	76.60	89.35	102.11	12.04	24.23	36.42	48.54	60.65	72.77	84.89	97.00
008	Yes	1	18.68	37.36	56.05	74.64	93.32	112.00	130.68	149.36	17.75	35.50	53.24	70.90	88.65	106.40	124.15	141.90
012	Yes	2	30.04	60.08	90.12	120.16	150.20	180.24	210.28	240.32	28.54	57.08	85.61	114.15	142.69	171.23	199.77	228.30
014	Yes	2	36.49	72.90	109.30	145.71	182.20	218.60	255.01	291.41	34.67	69.25	103.84	138.42	173.09	207.67	242.26	276.84
016	Yes	2	42.32	84.64	126.96	169.28	211.60	253.92	296.24	338.56	40.20	80.41	120.61	160.82	201.02	241.22	281.43	321.63

HEAT REJECTION (MBtuh)* (15 F Subcooling)

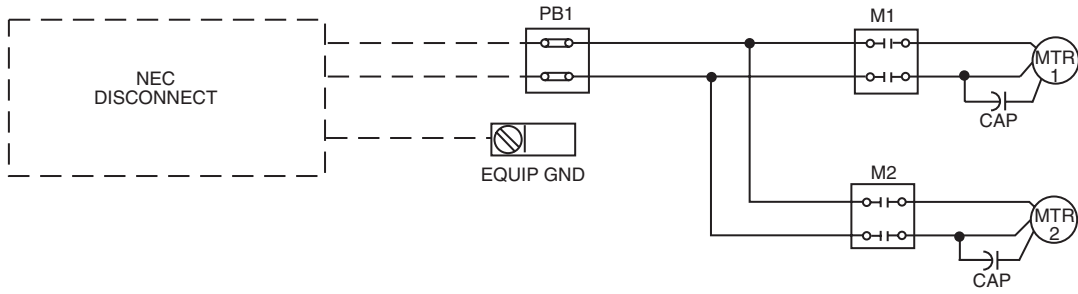
UNIT 09AZL, 09AZW	SUB- COOLER	CKTS	TEMPERATURE DIFFERENCE (TD) (F)															
			Refrigerant R-22								Refrigerant R-134a							
			5	10	15	20	25	30	35	40	5	10	15	20	25	30	35	40
006	Yes	1	N/A	N/A	36.08	48.08	60.09	72.09	84.09	96.09	11.33	22.80	34.28	45.68	57.08	68.48	79.89	91.29
008	Yes	1	N/A	N/A	52.75	70.24	87.82	105.40	122.98	140.57	16.70	33.41	50.11	66.73	83.43	100.13	116.84	133.54
012	Yes	2	N/A	N/A	84.81	113.08	141.35	169.62	197.89	226.17	26.86	53.71	80.57	107.43	134.29	161.14	188.00	214.86
014	Yes	2	N/A	N/A	102.86	137.12	171.47	205.73	239.99	274.25	32.63	65.17	97.72	130.27	162.89	195.44	227.99	260.54
016	Yes	2	N/A	N/A	119.48	159.31	199.14	238.96	278.79	318.62	37.84	75.67	113.51	151.34	189.18	227.02	264.85	302.69

*Per circuit.

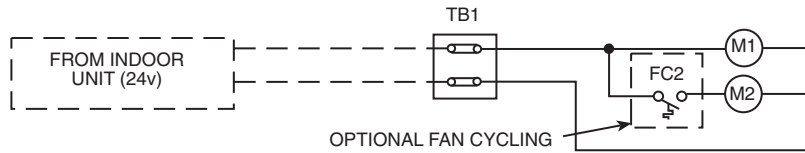
Typical wiring schematic



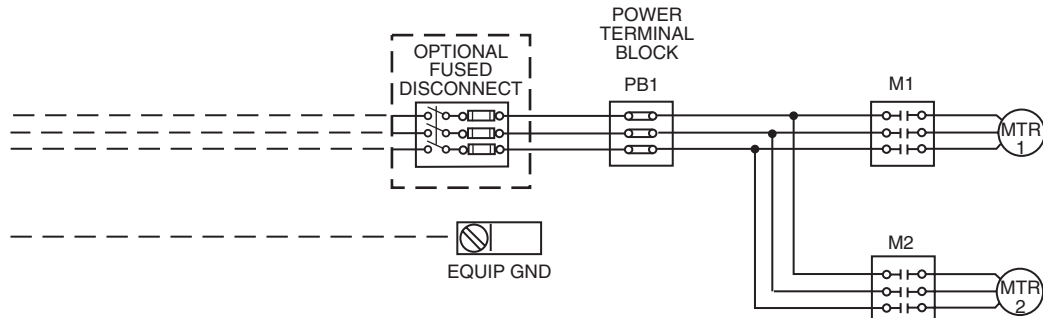
SINGLE PHASE POWER SCHEMATIC



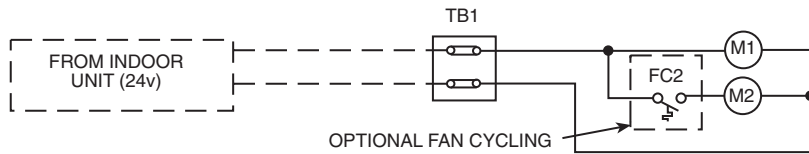
CONTROL SCHEMATIC



THREE PHASE POWER SCHEMATIC



CONTROL SCHEMATIC



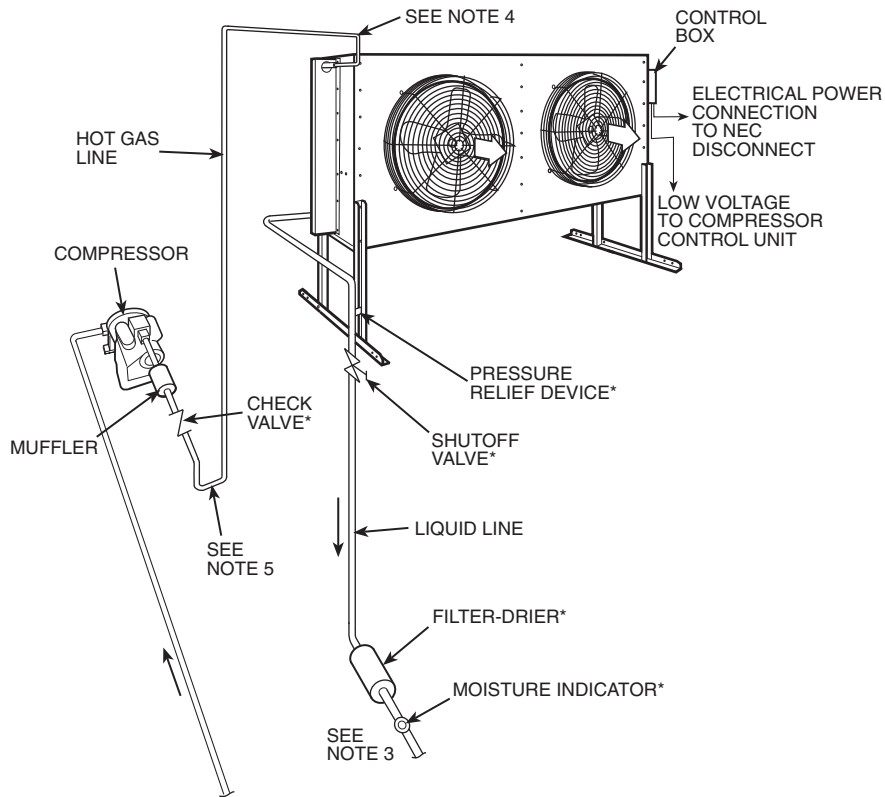
LEGEND

CAP	— Capacitor
EQUIP	— Equipment
FC2	— Fan Cycling Control
GND	— Ground
M1, M2	— Fan Motor Contactor
MTR1, MTR2	— Fan Motor
NEC	— National Electrical Code
PB1	— Power Terminal Block
TB1	— Control Terminal Block

NOTES:

1. Motor 1 is located on header end of the unit.
2. Field control connections are made to terminal block TB1. Contactor (when supplied) holding voltage is 24 volts.
3. See unit wiring book for wiring with factory-installed head pressure control.

CONDENSER WITH SINGLE COMPRESSOR

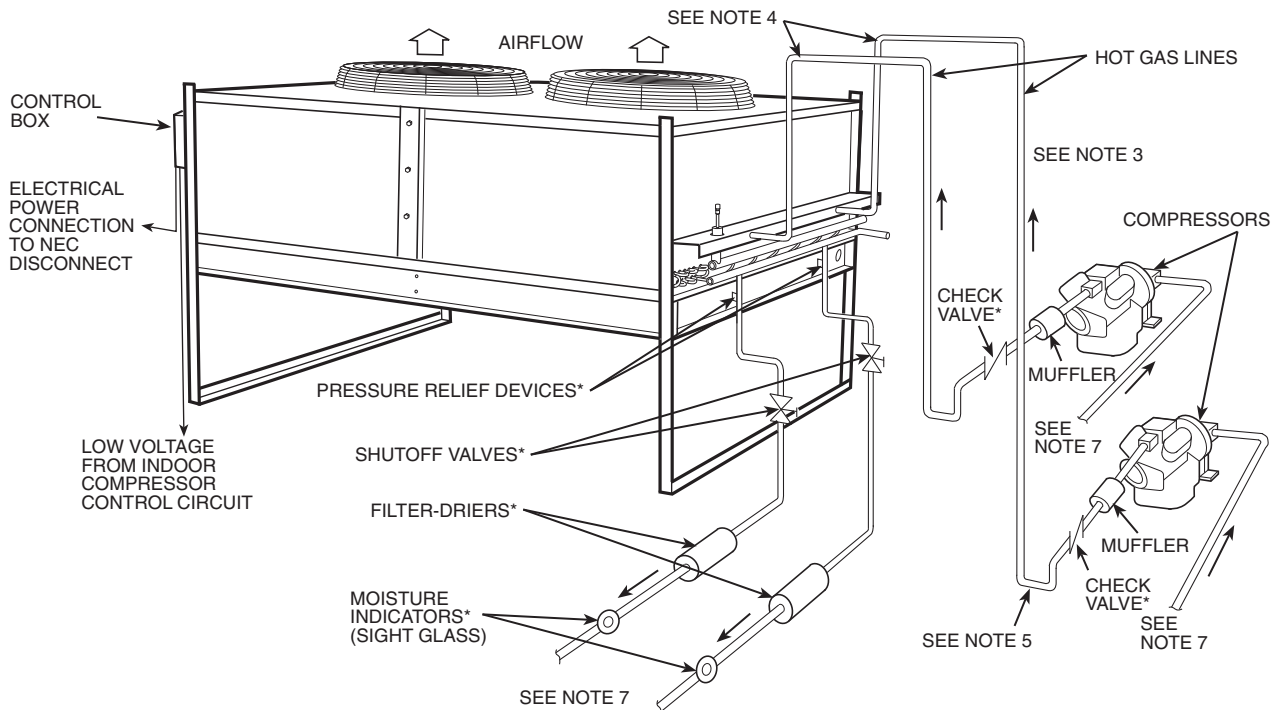


*Field supplied.

NOTES:

1. Wiring and piping shown are general points of connection guides only and are not intended for or to include all details for a specific installation.
2. All wiring must comply with applicable local and national codes.
3. All piping must follow standard piping techniques. Refer to Carrier System Design Manual, part 3, or the Carrier E20-II® Software Refrigerant Piping program, for proper piping sizes and design.
4. Hot gas lines should rise above refrigerant level in condenser circuit.
5. Trap should be installed on hot gas lines to prevent condenser oil and refrigerant vapor migration from accumulating on compressor heads during off cycle.
6. For piping lengths greater than 50 ft (15.2 m), provide support to liquid and gas lines near the connections to the coil.
7. Pitch all horizontal lines downward in the direction of refrigerant flow.
8. For pressure relief requirements, see latest revision of ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) Standard 15, Safety Code for Mechanical Refrigeration.

CONDENSER WITH DUAL SPLIT SYSTEM



Electrical data



UNIT 09AWH, 09AWV	V-PH-Hz	VOLTAGE RANGE		CONDENSER FAN			POWER SUPPLY*	
		Min	Max	†	Hp/Fan	FLA	MCA	MOCP
001, 002, 003, 004	208/230-1-60	187	253	1	1/2	2.5	3.1	20
	208/230-3-60	187	253	1	1/2	2.0	2.5	20
	460-3-60	414	506	1	1/2	1.0	1.3	20
	575-1-60	518	632	1	1/2	1.0	1.3	20
006, 008, 012	208/230-1-60	187	253	2	1/2	2.5	5.6	20
	208/230-3-60	187	253	2	1/2	2.0	4.5	20
	460-3-60	414	506	2	1/2	1.0	2.3	20
	575-1-60	518	632	2	1/2	1.0	2.3	20
014, 016, 018, 020	208/230-1-60	187	253	2	1 1/2	4.9	11.0	20
	208/230-3-60	187	253	2	1 1/2	6.5	14.6	20
	460-3-60	414	506	2	1 1/2	3.3	7.4	20
	575-3-60	518	632	2	1 1/2	2.4	5.4	20

UNIT 09AZH, 09AZV	V-PH-Hz	VOLTAGE RANGE		CONDENSER FAN			POWER SUPPLY*	
		Min	Max	†	Hp/Fan	FLA	MCA	MOCP
006	208/230-1-60	187	253	1	1/2	2.5	3.1	20
	208/230-3-60	187	253	1	1/2	2.0	2.5	20
	460-3-60	414	506	1	1/2	1.0	1.3	20
	575-1-60	518	632	1	1/2	1.0	1.3	20
008	208/230-1-60	187	243	2	1/2	2.5	5.6	20
	208/230-3-60	187	253	2	1/2	2.0	4.5	20
	460-3-60	414	506	2	1/2	1.0	2.3	20
	575-1-60	518	632	2	1/2	1.0	2.3	20
012, 014, 016	208/230-1-60	187	253	2	1 1/2	4.9	11.0	20
	208/230-3-60	187	253	2	1 1/2	6.5	14.6	20
	460-3-60	414	506	2	1 1/2	3.3	7.4	20
	575-3-60	518	632	2	1 1/2	2.4	5.4	20

UNIT 09AWL, 09AWV	V-PH-Hz	VOLTAGE RANGE		CONDENSER FAN			POWER SUPPLY*	
		Min	Max	†	Hp/Fan	FLA	MCA	MOCP
001, 002, 003, 004	208/230-1-60	187	253	1	1/4	1.4	1.8	20
	208/230-3-60	187	253	1	1/4	1.1	1.4	20
	460-3-60	414	506	1	1/4	0.65	0.8	20
006, 008, 012	208/230-1-60	187	243	2	1/4	1.4	3.2	20
	208/230-3-60	187	253	2	1/4	1.1	2.5	20
	460-3-60	414	506	2	1/4	0.65	1.5	20
014, 016, 018, 020	208/230-1-60	187	253	2	1/2	2.7	5.1	20
	208/230-3-60	187	253	2	1/2	2.2	5.0	20
	460-3-60	414	506	2	1/2	1.1	2.5	20

UNIT 09AZL, 09AZV	V-PH-Hz	VOLTAGE RANGE		CONDENSER FAN			POWER SUPPLY*	
		Min	Max	†	Hp/Fan	FLA	MCA	MOCP
006, 008	208/230-1-60	187	253	2	1/4	1.4	3.2	20
	208/230-3-60	187	253	2	1/4	1.1	2.5	20
	460-3-60	414	506	2	1/4	0.65	1.5	20
012, 014, 016	208/230-1-60	187	253	2	1/2	2.7	6.1	20
	208/230-3-60	187	253	2	1/2	2.2	5.0	20
	460-3-60	414	506	2	1/2	1.1	2.5	20

LEGEND

- FLA** — Full Load Amps
- MCA** — Minimum Circuit Amps
- MOCP** — Maximum Overcurrent Protective Device (see Note 1)
- NEC** — National Electrical Code

*Min Ckt Amps and MOCP Amps values per NEC rounded to full wire size (see Note 1).

†Fan quantity.

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (NEC Articles 430 and 440), the overcurrent protective device for the unit shall be either HACR circuit breaker (where available) or fuse. Canadian units may be fuse or circuit breaker.
2. Wire sizing amps (MCA) are a sum of 125% of the condenser-fan motor FLA.
3. Motors are protected against primary single phasing condition.
4. Three-phase voltage imbalance must not exceed 2%.
5. 575-v units not available with low sound motors.

Operating sequence

The 09AW,AZ condensing unit may be used with different types of compressor and evaporator combinations. The sequence of operation is dependent on the compressor and specific indoor unit.

General application — Whenever there is a call for cooling the condenser fan starts with the compressor and runs as long as there is a call for cooling. On 2 circuit units both fans are activated on the call for first stage and run with the lead compressor.

Application with 50BZ units — The following control sequence is for the 09AW and 09AZ when matched with the 50BZ unit.

Cooling — On a call for cooling, the thermostat closes and energizes terminals Y1 and T1 on the 50BZ unit low voltage terminal strip. The fan-motor contactor (M) is energized with 24 v through terminals T1 and C. The fan(s) will continue to run until the thermostat is satisfied. At that time, the thermostat will open T1, and the fan will stop immediately.

If the condenser-fan motor overheats due to motor overload or lack of cooling air, the internal fan protector will open the circuit internally in the motor, and the fan will stop. If a safety control in the 50BZ unit opens, the 09AW or 09AZ condenser fan will not be affected, and the fan will continue to run as long as the thermostat is closed.

Factory-installed optional controls

Fan cycling head pressure control — This option allows operations to 30 F (depending on load) by stopping the second condenser fan at outdoor temperatures below 60 F. It is recommended that the second fan on all 2 condenser-fan units be equipped with this option to better match load to condenser capacity.

NOTE: This option will be installed on all 2 condenser-fan units with speed control.

Speed head pressure control (low ambient kit) —

This option contains a fan speed-control device activated by a pressure sensor. With the speed control, the condenser-fan motor speed is controlled in response to the saturated condensing pressure. This factory-installed option maintains the condensing temperature at $100 \pm 10^\circ \text{F}$ ($38 \pm 6^\circ \text{C}$) for outdoor temperatures down to -20°F (-29°C).

The speed control consists of a solid-state circuit on a printed circuit board, sensor, transformer, and single phase compatible condenser-fan motor.

NOTE: The fan cycling head pressure control is included on all 2 condenser-fan units with speed control.

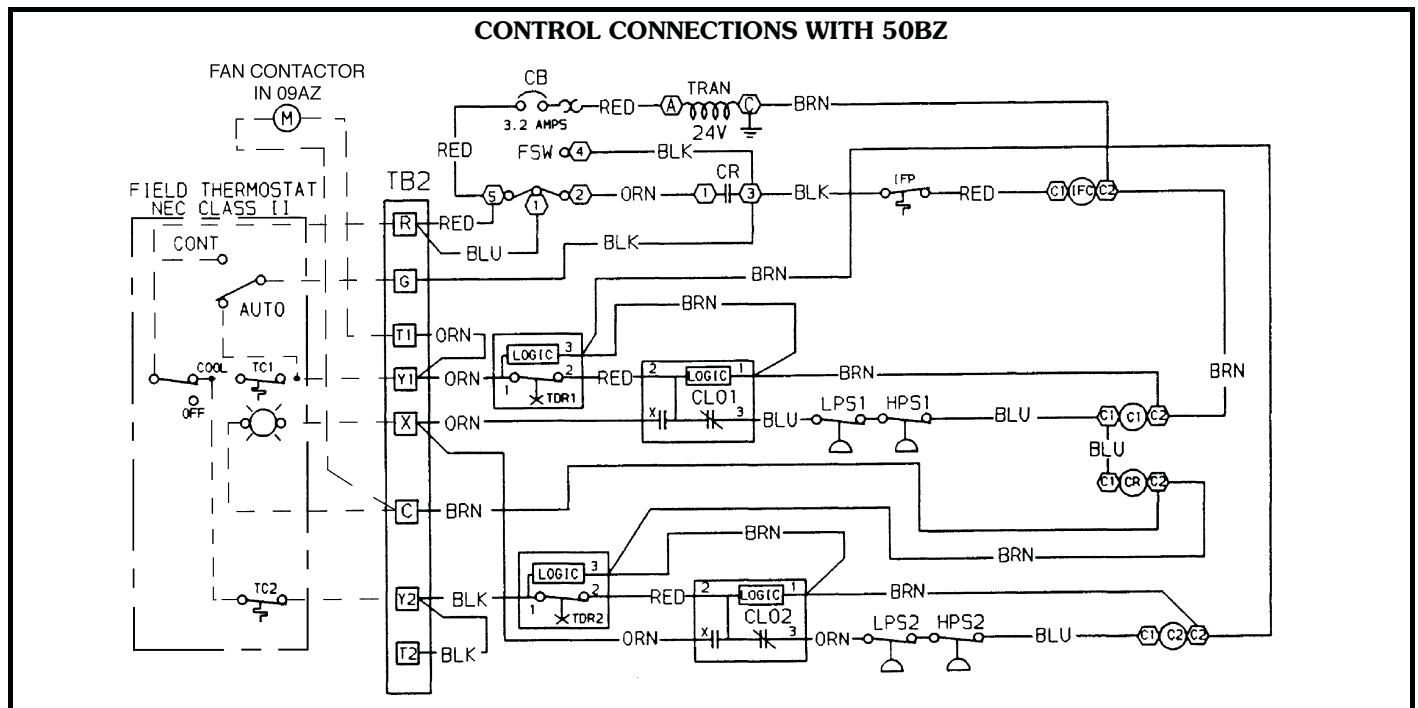
Field-installed controls

Defrost thermostat (50BB-900---001) — The defrost thermostat is installed on the evaporator coil and is recommended for use with the winter start control. The thermostat will open the control switch if frost begins to form on the evaporator coil. The compressor will stop but the 09AW or 09AZ unit will continue to run.

Solenoid valve — A field-supplied solenoid valve (located at indoor unit) wired in parallel with the compressor contactor coil will shut off the liquid line to prevent refrigerant migration back to the compressor during the off cycle. This valve is recommended for installations where piping length is over 75 ft (22.9 m). If 2 liquid line solenoid valves are used (units over $7\frac{1}{2}$ tons), check available transformer volt-ampere capability.

Winter start (CRWINSTR001A00) — When used in conjunction with the speed control option, the winter start control will bypass the low pressure switch for 3 minutes on compressor start-up to allow system pressures to stabilize.

NOTE: If units matched with 09AW or 09AZ condenser units are equipped with a 27 psig low-pressure switch (i.e., 50BZ), the 3-minute low-pressure switch bypass is recommended for operation below 50 F.



Application data



Location

For best results unit must be properly located and installed in an area having adequate airflow. Locate condenser where an adequate supply of outdoor air is available. Do not locate where the possibility of air recirculation exists, such as under a roof overhang. Locate condenser in an area free from airborne dirt or other foreign material which could clog condenser coils. Recirculation of condenser air will result in increased head pressure which may cause units to trip on high pressure.

If roof installation is required, make certain that roof structure can support the condenser weight.

The 09AW and 09AZ units are designed for outdoor applications. If the unit is mounted indoors, provisions must be made to ensure that discharge air is not recirculated into the unit.

Horizontal units 09AWH,AWL,AZH,AZL should be installed with coil side facing the prevailing winds. If strong variable winds are common, it is recommended that a field fabricated wind deflector be used on the discharge side of the unit. Maintain at least 24 inches between the face of the coil and any obstruction such as another unit or a wall. If the unit discharges toward a wall, space the unit at least 60 inches from the wall. If several units are installed in the same area, make sure that discharge air from one unit does not become intake air for another.

Unit mounting

Vertical units 09AWV,AWW,AZV,AZW and smaller horizontal units, when installed as vertical discharge units, should be located no closer than the width of the unit to an obstruction, such as a wall or another unit. Keep the area around each unit clear to avoid restricting the airflow to the unit. There should be 4 ft (1.22 m) for service and for unrestricted airflow on all sides of unit and a minimum 8 ft (2.44 m) clear air space above units. For multiple units, allow width of unit separation between units for airflow and service.

Models 09AW001-012, 09AZ006, and 09AZ008 can be assembled for either horizontal or vertical airflow. The mounting stand is shipped unassembled with each unit. It is a simple procedure to assemble the stand to the unit for either vertical or horizontal airflow.

Vertical airflow units 09AWV,AWW014-020 and 09AZV,AZW012-016 are shipped with legs retracted, they must be adjusted to operating position for unit installation. No assembly is required. Horizontal models 09AWH,AWL014-020 and 09AZH,AZL012-016 must have the legs field installed. Legs are shipped with the unit.

Make sure units are installed level to ensure proper drainage of liquid refrigerant and oil. When units are installed on a roof, they must be mounted on support beams that span load walls. Ground mounted units should be installed on concrete pads of sufficient size to prevent grass and brush from blocking the unit inlet. When unit is in proper location, use mounting holes in legs for securing unit to supporting structure.

Unit isolation

Fasteners for mounting unit must be field supplied. If unit is to be mounted on vibration isolators, use mounting holes

in bottom of support legs as support points and locate isolators at those points. If vibration isolation is desired, rubber-in-shear pads are recommended under the four corners of the unit. Spring isolation is not recommended for floor-mounted units, but may be used for suspended units.

Ductwork for condenser air

Condenser supply and discharge must have adequate airflow. If the unit is ducted, the duct must not add more than 0.1 in. wg to the static pressure imposed on the fans. An 0.1 in. wg added static will decrease total heat rejection capability by approximately 3.2%.

Liquid lift and subcooling circuit

Amount of liquid lift available before refrigerant flashing occurs depends on amount of liquid subcooling in the system. All 9AW,AZ condensers have positive subcooling when applied with charge for 15 F subcooling and subcooling circuit. With subcooling, it is possible to overcome an appreciable pressure drop and/or static head pressure due to elevation of the liquid metering device above the condenser when condenser is below evaporator coil. However, subcooling will decrease the total heat rejection capability of the condenser. Subcooling results when a portion of the condenser tubes fill with liquid refrigerant, decreasing the condensing area.

The subcooling circuit option decreases condenser area (capacity) available for gas to liquid condensing by using some tubes as a last pass to ensure positive subcooling. The condensing circuits are combined and feed through the subcooling circuit to flood with liquid refrigerant and drop the temperature below the saturated condensing temperature. Subcooling requirements and the need for the optional subcooling circuit depends on the system design.

When 09AW,AZ condensers are applied with 5 F subcooling, they may not provide positive subcooling. If subcooling is required, it must be obtained by external means such as a liquid suction interchanger or the subcooling circuiting option available on all units. It is recommended that the evaporator be either at the same level as the condenser or lower than the condenser when 5 F subcooling is used.

Refrigerant line sizing

Sizing depends on length of lines between various sections of the refrigerant system. Consider the amount of liquid lift and drop in the system as well as proper compressor oil return. Consult Carrier System Design Manual, part 3, for proper piping sizes and design.

Use the following guideline for refrigerant piping:

Discharge lines

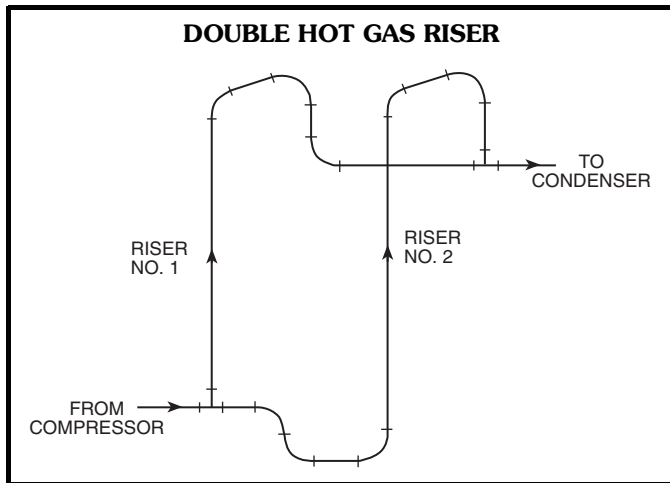
- Base line size on a 2° F change in saturated condensing temperature.
- Lines must be sized and routed so that oil is carried through the system. When the condenser is located at a higher level than the compressor, take special precautions that oil will return at reduced capacity. A double hot gas riser may be required with high lift and a large degree of unloading. Be sure to trap the connections between both risers.

NOTE: Double hot gas riser shown on next page.

Application data (cont)



Protect the compressor from liquid refrigerant or oil draining back during compressor off cycles. The highest point in the discharge line should be above highest point in the condenser coil. A purge valve should be applied at this point. The hot gas line should loop to the floor if the condenser is located above the compressor, especially if the hot gas riser is long. If the condenser is located where the entering-air temperature could be higher than the entering-air temperature at the compressor location, a check valve should be installed in the hot gas line.



Liquid lines

- Liquid lines can generally be sized for a 1 to 2° F change in saturation temperature.
- Liquid lines should be as small as possible to minimize system change.
- Piping should be routed to avoid excessive strain on system components or the piping itself. Discharge lines must be supported with rigid pipe supports to prevent transmission of vibration and movement of the line. The discharge line should be well supported near the condenser hot gas connection. Use offsets in interconnecting lines between 2 condensers and provide isolation where pipes pass through building walls or floors.

NOTE: A receiver, if used in the system, should be located below the condenser, and the condenser to receiver liquid line must be sized to allow free drainage. This line should be sized so the velocity does not exceed 100 fpm. Generous sizing of this liquid (condensate) line is especially important if the receiver is exposed at any time to a warmer entering-air temperature than the condenser. It must be large enough for the liquid to flow to the receiver and, at the same time, allow flow of refrigerant vapor in the positive direction back to the condenser. The receiver will become vapor locked under these conditions if re-evaporated gas is not allowed to flow back to the condenser for re-condensation. Liquid lines should be free of any traps or loops.

Condenser head pressure control

Efficient operation of evaporator thermostatic expansion valve requires a 90 F minimum saturated condensing temperature when compressor is operating at 100% capacity, 80 F for 75% capacity, and 70 F for 50% to 25% capacity.

A drop in the entering-air temperature results in a lower saturated condensing temperature. When outdoor-air temperature drops below the minimum temperature listed in the Minimum Outdoor-Air Operating Temperature table on page 29, head pressure control is required.

On 2 condenser-fan units, fan cycling control can be applied to one fan to achieve head pressure control. When fan cycling alone will not achieve the required minimum motor speed control is required. When motor speed control is used on 2-fan units, it is always applied with fan cycling control on the other motor.

NOTE: Minimum Outdoor-Air Operating Temperature table shows the minimum temperature with fan cycling control and head pressure control.

Units are not qualified for use with Motormaster® speed control, but use a similar device. When outdoor temperatures are low enough to cause low condensing pressures, the head pressure control modulates the motor speed of one condenser fan from full to minimum rpm to maintain a constant saturated condensing temperature for full year-round head pressure control. The control works only with single-phase motors, so on 3-phase units the motor is changed to a single-phase motor. When units have a low-pressure switch, the use of the winterstart kit (CRWINSTR001A00) is recommended. The winterstart kit bypasses the low-pressure switch on start-up. The use of the defrost thermostat kit (50BB-900-001) also is recommended to sense frost on the evaporator coil if suction temperature drops too low.

Process applications

Process applications are defined as heat rejection loads which are not related to or significantly affected by outdoor conditions. Process applications tend to have constant heat rejection requirements throughout the year. Consequently, these applications may require switching the set point of the fan cycling control. Consult application engineering for assistance in designing and selecting process systems.

Corrosion Protection

E-coated aluminum-fin coils have an extremely flexible and durable epoxy coating uniformly applied to all coil surfaces. Unlike brittle phenolic dip and bake coatings, E-coat provides superior protection with unmatched flexibility, edge coverage, metal adhesion, thermal performance and, most importantly, corrosion resistance. E-coated coils provide this protection since all coil surfaces are completely encapsulated from environmental contamination. Specify E-coated aluminum-fin coils for industrial environments with high levels of air pollution. This option also provides better protection compared to standard or pre-coated aluminum-fin coils in industrial environments.

E-coated copper-fin coils have the same flexible and durable epoxy coating as E-coated aluminum-fin coils. However, this option combines the natural salt and environmental resistance of all-copper construction with the highest level of corrosion protection. Specify E-coated copper-fin coils in the harshest combination of coastal and industrial environments.



MINIMUM OUTDOOR-AIR OPERATING TEMPERATURE

FAN	HEAD PRESSURE CONTROL	REFRIGERANT TEMPERATURE DIFFERENCE	COMPRESSOR CAPACITY (%)			
			100	75	50	25
			Minimum Outdoor Air Temperatures (F)			
1	None	30	60	57	55	62
		25	65	61	57	64
		20	70	65	60	65
	Head Pressure Control	30	-20	-20	-20	-20
		25				
		20				
2	None	30	60	57	55	62
		25	65	61	57	64
		20	70	65	60	65
	Fan Cycle Switch	30	33	38	42	56
		25	43	45	47	58
		20	52	52	51	61
	Head Pressure Control	30	-20	-20	-20	-20
		25				
		20				



Air-Cooled Condensers

HVAC Guide Specifications

Size Range: **1 to 20 Tons**

Carrier Model Number: **09AW**

Part 1 — General

1.01 SYSTEM DESCRIPTION

Outdoor mounted, packaged air-cooled remote condenser. Unit shall discharge condenser air vertically or horizontally as shown on contract drawings.

1.02 QUALITY ASSURANCE

- A. Units shall be rated using refrigerant R-22 or R-134a. Ratings shall be listed at 5 F subcooling and 15 F subcooling refrigerant charge and in accordance with ARI Standard 460.
- B. Unit shall be designed to conform to the latest ANSI/ASHRAE 15 revision safety code, and UL Standard 1995, and shall be UL listed under both American and Canadian Standards.
- C. Coils shall be leak tested at 450 psig and unit operation shall be tested at the factory.

1.03 DELIVERY, STORAGE AND HANDLING

Units shall be stored and handled according to manufacturer's recommendations.

Part 2 — Products

2.01 EQUIPMENT

A. General:

Outdoor mounted, packaged, air-cooled remote condenser. Factory-assembled unit shall consist of condenser coil, fan(s) and motor(s), mounting legs, factory wiring, piping and controls, and a charge of dry nitrogen.

B. Unit Cabinet:

- 1. Cabinet shall be constructed of minimum 18 gage corrosion resistant zinc coated galvanized steel and are capable of withstanding Federal test Method Standard No. 141 (Method 6061) 500-hour salt spray test. Optional heavy gage embossed aluminum shall be available.
- 2. Two-fan units shall be divided by full-width baffles to separate individual fan sections, prevent air bypass, and provide additional casing rigidity.
- 3. Units 12 ton and larger shall be furnished with lifting holes to aid in rigging.
- 4. Panels for servicing shall be easily removable using a single wrench size.
- 5. Unit sizes 1 ton to 10 ton shall have minimum 12 gage galvanized steel mounting legs 15 in. high and mounting rails. Legs shall be shipped with the unit for field assembly. Headers shall be arranged for horizontal or vertical airflow.
- 6. Unit sizes 12 ton to 20 ton shall have minimum 10 gage galvanized steel legs 18 in. high and 12 gage base rail.
- 7. Unit sizes 12 to 20 ton shall be factory arranged for vertical or horizontal airflow as required.

Headers shall have proper arrangement and connection locations for correct refrigerant and oil return for the required airflow.

C. Fans:

Fans shall be propeller type, direct driven by weatherproof motors, and dynamically balanced. Discharge side shall be protected by corrosion-resistant fan guards constructed of vinyl coated close-mesh steel wire. Fans shall have dual square head set screws spaced 90 degrees apart that seat onto one flat and one keyway on the motor shaft.

D. Coils:

Coils shall use $\frac{3}{8}$ -in. OD copper tube with staggered aluminum fin (or optional copper tube with copper fin, or be coated with polyester or E-coat flexible fin treatment as required) and galvanized steel tube sheets. Fins shall be bonded to tubes by mechanical expansion. Hot gas and liquid connections shall be made from the same end. Coil circuiting shall be single (100% capacity) or dual (50/50% capacity) circuit with or without a final pass subcooling circuit as required by the application. Fins shall not exceed 14 fins per inch.

- 1. Copper-fin coils shall be constructed of copper-fins mechanically bonded to copper-tubes and copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting sheet metal coil pan to minimize potential for galvanic corrosion between the coil and pan. All copper construction shall provide protection in moderate coastal environments.
- 2. E-Coated aluminum-fin coils shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss requirements of 60° of 65 to 90% per ASTM D523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross hatch adhesion of 4B-5B per ASTM D3359-93. Impact resistance shall be up to 160 in./lb (ASTM D2794-93). Humidity and water immersion resistance shall be up to a minimum of 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 1000 hours salt spray per ASTM B117-90. Coil construction shall be aluminum-fins mechanically bonded to copper tubes.
- 3. E-Coated copper-fin coils shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss requirements of 60° of 65 to 90% per ASTM D523-89. Uniform dry film



thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross hatch adhesion of 4B-5B per ASTM D3359.93. Impact resistance shall be up to 160 in./lb (ASTM D2794-93). Humidity and water immersion resistance shall be up to a minimum of 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 1000 hours salt spray per ASTM B117-90. Coil construction shall be copper-fins mechanically bonded to copper-tubes with copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting sheet metal coil pan to maintain coating integrity and minimize corrosion potential between the coil and pan.

E. Motors:

Motors shall be weatherproof and inherently protected to operate at the specified electrical characteristics. Motor shall have permanently lubricated ball bearings. When required by environmental conditions, optional TEAO (Totally Enclosed, Air Over) motors shall be used. Motors shall be factory wired to weatherproof NEMA 3R control box on opposite header end of unit. Fan motors shall be a rigid base type mounted to 12 gage galvanized steel rails for sizes 1 to 12. All other sizes have basket type motor mount. When required by specification low-sound motors shall be provided.

F. Operating Characteristics:

Unit shall be capable of rejecting the required heat at the required cfm and be capable of operating at moderate entering-air temperatures as standard and at reduced entering-air temperatures with optional fan cycling or fan motor speed control.

G. Electrical Characteristics:

All electrical power wiring shall enter the unit cabinet at a single location. Control circuit is 24 v and control wiring shall enter the unit control box at one connection only.

H. Special Features:

Units shall be furnished with optional factory-mounted or field-installed special features (as required by application).

1. Embossed Aluminum cabinet shall be provided for enhanced appearance and corrosion protection.
2. Extended length (30-in., 48-in., 72-in.) mounting legs for unit sizes 12 ton and larger.

3. Low sound condenser-fan motors shall be furnished for lower condenser-fan sound applications.
4. Fan contactor shall be factory wired to the condenser fan with 24 v coil for connection to indoor compressor unit.
5. Fan cycling (two-fan units only) shall include temperature actuated fan cycling switch, fan contactors, and low voltage terminal strip. Factory-mounted control cycles one fan in response to entering air-temperature to maintain head pressure.
6. Fan motor speed control shall be provided to allow operation to -20 F. Factory mounted controller modulates the speed of the lead condenser fan in response to discharge head pressure. Fan cycling control and contactors provided wired with controls. Control shall include all components of fan cycling control and a single-phase motor qualified for use with speed control and speed controller.
7. Totally Enclosed, Air Over (TEAO) condenser-fan motors shall be furnished for protection in harsh environments.
8. Final pass subcooling circuit shall be provided to allow additional cooling of refrigerant to compensate for long refrigerant line or applications with condenser below compressor.
9. Copper tube with copper fin or pre-coated or E-coated fins for corrosion protection.
10. Fused disconnect switch for 3-phase units.
11. Control transformer with 24 v output to operate condenser and/or compressor and evaporator.
12. Defrost thermostat shall be available for field-installation on the evaporator coil for use with the winter start control. The thermostat will open the control switch if frost begins to form on the evaporator coil. The compressor will stop but the 09AW or 09AZ unit will continue to run.
13. Solenoid valve shall be a field-supplied solenoid valve (located at indoor unit) wired in parallel with the compressor contactor coil. The valve will shut off the liquid line to prevent refrigerant migration back to the compressor during the off cycle.
14. Winter start shall be available for use in conjunction with the speed control option. The winter start control will bypass the low-pressure switch for 3 minutes on compressor start-up to allow system pressures to stabilize.



Air-Cooled Condensers

HVAC Guide Specifications

Size Range: **5 to 15 Tons**

Carrier Model Number: **09AZ**

Part 1 — General

1.01 SYSTEM DESCRIPTION

Outdoor mounted, packaged air-cooled remote condenser. Unit shall discharge condenser air vertically or horizontally as shown on contract drawings.

1.02 QUALITY ASSURANCE

- A. Units shall be rated using refrigerant R-22 or R-134a. Ratings shall be listed at a minimum (5 F subcooling) and optimum (15 F subcooling) refrigerant charge and in accordance with ARI Standard 460. Units shall be rated with 50BZN units of the same nominal size and listed in ARI directory.
- B. Unit shall be designed to conform to ANSI/ASHRAE 15, latest revision safety code, and UL Standard 1995, and shall be UL listed under both American and Canadian Standards.
- C. Coils shall be leak tested at 450 psig and unit operation shall be tested at the factory.

1.03 DELIVERY, STORAGE, AND HANDLING

Units shall be stored and handled according to manufacturer's recommendations.

Part 2 — Products

2.01 EQUIPMENT

A. General:

Outdoor mounted, packaged, air-cooled remote condenser. Factory-assembled unit shall consist of condenser coil, fan(s) and motor(s), mounting legs, factory wiring, piping and controls, and a charge of dry nitrogen.

B. Unit Cabinet:

1. Cabinet shall be constructed of minimum 18 gage corrosion resistant zinc coated galvanized steel and are capable of withstanding Federal method Standard No. 141 (Method 6061) 500-hour salt spray test. (Optional heavy gage embossed aluminum shall be available.)
2. Two-fan units shall be divided by full width baffles to separate individual fan sections and prevent air bypass and provide additional casing rigidity.
3. Unit sizes 10 ton and larger shall be furnished with lifting holes to aid in rigging.
4. Panels for servicing shall be easily removable using a single wrench size.
5. Unit sizes 5 ton to 7¹/₂ ton shall have minimum 12 gage galvanized steel mounting legs, 15 in. high, and mounting rails. Legs shall be shipped with the unit for field assembly. Headers are to be arranged for horizontal or vertical airflow.

6. Unit sizes 10 ton to 15 ton shall have minimum 10 gage galvanized steel legs, 18 in. high, and 12 gage base rail.
7. Unit sizes 10 to 15 ton shall be factory arranged for vertical or horizontal airflow as required. Headers shall have proper arrangement and connection locations for correct refrigerant and oil return for the required airflow.

C. Fans:

Fans shall be propeller type, direct driven by weatherproof motors, and dynamically balanced. Discharge side shall be protected by corrosion-resistant fan guards constructed of vinyl coated close-mesh steel wire. Fans shall have dual square head set screws spaced 90 degrees apart which seat onto one flat and one keyway on the motor shaft.

D. Coils:

Coils shall use 3/8-in. OD copper tubes with staggered aluminum fin (or optional copper tube with copper fin, or be coated with polyester or E-coat flexible fin treatment as required) and galvanized steel tube sheets. Fins shall be bonded to tubes by mechanical expansion. Hot gas and liquid connections shall be made from the same end. Coil circuiting shall be single, 5 and 7¹/₂ ton (100% capacity) or dual, 10 to 15 ton (50/50% capacity) circuit with a final pass subcooling circuit. Fins shall not exceed 14 fins per inch.

1. Copper-fin coils shall be constructed of copper-fins mechanically bonded to copper-tubes and copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting sheet metal coil pan to minimize potential for galvanic corrosion between the coil and pan. All copper construction shall provide protection in moderate coastal environments.
2. E-Coated aluminum-fin coils shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss requirements of 60° of 65 to 90% per ASTM D523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross hatch adhesion of 4B-5B per ASTM D3359-93. Impact resistance shall be up to 160 in./lb (ASTM D2794-93). Humidity and water immersion resistance shall be up to a minimum of 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 1000 hours salt spray per ASTM B117-90. Coil construction shall be aluminum-fins mechanically bonded to copper tubes.



3. E-Coated copper-fin coils shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss requirements of 60° of 65 to 90% per ASTM D523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross hatch adhesion of 4B-5B per ASTM D3359.93. Impact resistance shall be up to 160 in./lb (ASTM D2794-93). Humidity and water immersion resistance shall be up to a minimum of 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 1000 hours salt spray per ASTM B117-90. Coil construction shall be copper-fins mechanically bonded to copper-tubes with copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting sheet metal coil pan to maintain coating integrity and minimize corrosion potential between the coil and pan.

E. Motors:

Motors shall be weatherproof and inherently protected to operate at the specified electrical characteristics. Motor shall have permanently lubricated ball bearings. When required by environmental conditions, optional TEAO (Totally Enclosed, Air Over) motors shall be used. Motors shall be factory wired to weatherproof NEMA 3R control box on opposite header end of unit. Fan motors shall be a rigid base type mounted to 12 gage galvanized steel rails. When required by specifications low-sound motors shall be provided.

F. Operating Characteristics:

Unit shall be capable of rejecting the required heat at the required cfm and be capable of operating at moderate ambient temperatures with standard factory-supplied fan cycling and at reduced ambient temperatures with optional fan cycling or motor speed control.

G. Electrical Characteristics:

All electrical power wiring shall enter the unit cabinet at a single location. Fan motor contactors shall be provided and wired to condenser fans. Control circuit is 24 v and control wiring shall enter the unit control box at one connection only.

H. Special Features:

Units shall be furnished with optional factory mounted or field-installed special features (as required by application).

1. Embossed Aluminum cabinet shall be provided for enhanced appearance and corrosion protection.
2. Extended 30-in. mounting legs for unit sizes 10 ton and larger.
3. Low sound condenser-fan motors shall be furnished for lower condenser-fan sound applications.
4. Fan cycling (two-fan units only) shall include temperature actuated fan cycling switch, fan contactors, and low voltage terminal strip. Factory-mounted control cycles one fan in response to entering air-temperature to maintain head pressure.
5. Fan motor speed control shall be provided to allow operation to -20 F. Factory mounted controller modulates the speed of the lead condenser fan in response to discharge head pressure. Fan cycling control and contactors provided wired with controls. Control shall include all components of fan cycling control and a single-phase motor qualified for use with speed control and speed controller.
6. Totally Enclosed, Air Over (TEAO) condenser-fan motors shall be furnished for protection in harsh environments.
7. Final pass subcooling circuit shall be provided to allow additional cooling of refrigerant to compensate for long refrigerant line or applications with condenser below compressor.
8. Copper tube with copper fin or pre-coated or E-coated fins for corrosion protection.
9. Fused disconnect switch for 3-phase units.
10. Control transformer with 24 v output to operate condenser and/or compressor and evaporator.
11. Defrost thermostat shall be available for field-installation on the evaporator coil for use with the winter start control. The thermostat will open the control switch if frost begins to form on the evaporator coil. The compressor will stop but the 09AW or 09AZ unit will continue to run.
12. Solenoid valve shall be a field-supplied solenoid valve (located at indoor unit) wired in parallel with the compressor contactor coil will shut off the liquid line to prevent refrigerant migration back to the compressor during the off cycle.
13. Winter start shall be available for use in conjunction with the speed control option. The winter start control will bypass the low-pressure switch for 3 minutes on compressor start-up to allow system pressures to stabilize.



Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.