

## CHA11-1853 AND CHA11-2753 — 50 hz SINGLE PACKAGE AIR CONDITIONERS

COOLING

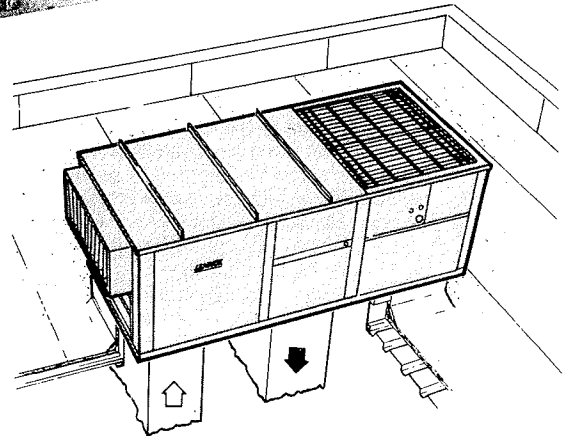
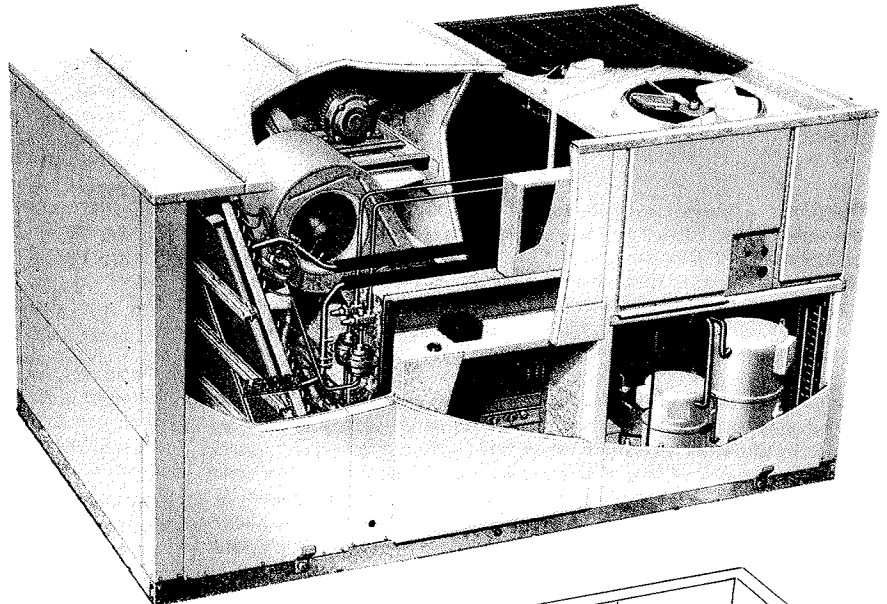
Single package

July 1988

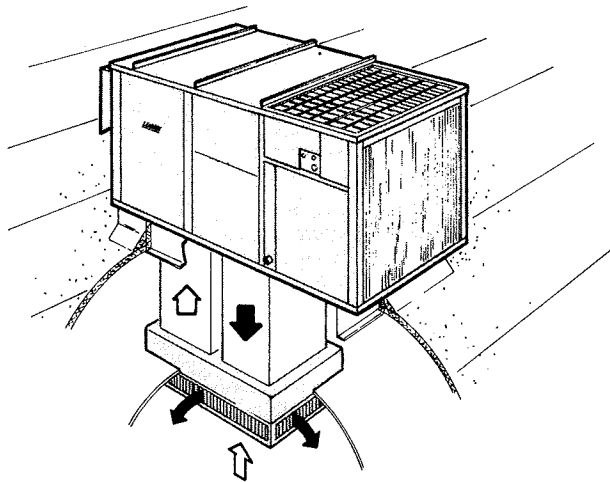
\*48.2 to 64.6 kW (164 500 to 220 300 Btuh) Cooling Capacity  
12.5 to 67.3 kW (42 700 to 229 600 Btuh) Optional Electric Heat  
104.0 to 130.0 kW (355 000 to 445 000 Btuh) Optional Hot Water Heat

\*At ARI Standard 360 Test Conditions

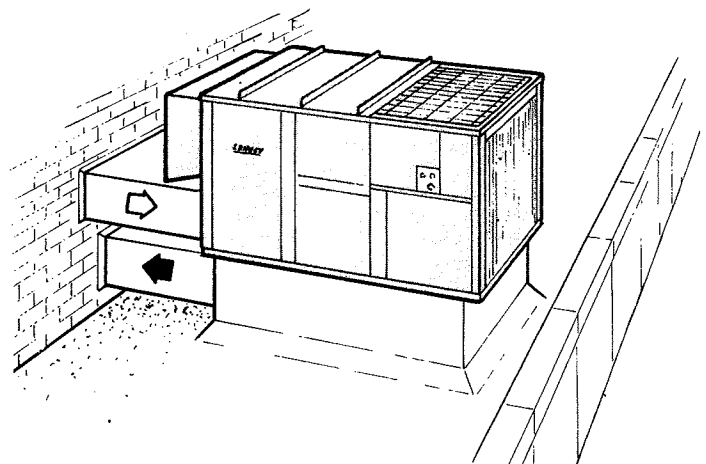
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Rooftop Installation with Double Duct Air Distribution System



Rooftop Installation with Combination Ceiling Supply and Return Air System



Rooftop Installation with Horizontal (End) Supply and Return Air System

## FEATURES

**Applications** — The Lennox single package CHA11 units are designed for rooftop installation with bottom handling of supply and return air. A separate roof mounting frame (optional) mates to the bottom of the unit and when flashed into the roof permits weatherproof duct connections and entry into the conditioned area. Separate supply and return air double duct, combination ceiling supply and return air duct, or horizontal end duct systems are applicable to the units. A choice of RTD step-down or FD flush model diffusers are available for combination ceiling supply and return air distribution systems. Economizer dampers option will provide "free cooling" by using outdoor air in lieu of mechanical refrigeration. Units are available with optional electric or hot water heat. Thermostat and system controls are not supplied and must be ordered extra. Available as options are electro-mechanical or Flexstat control systems. Also available are LVAV Varizone system controls. Units are shipped completely factory assembled, piped, and wired. In addition, each unit is test operated at the factory before shipment, ensuring unit dependability. For other control systems see Accessories Section or contact Lennox.

**Approvals** — Units have been rated in the Lennox Research Laboratory environmental test room in accordance with Air-Conditioning and Refrigeration Institute (ARI) Standard 360-86 test conditions. Units and components within are bonded for grounding to meet safety standards for servicing required by Underwriters Laboratories (U.L.) and the International Electrotechnical Commission (IEC). Blower data is from tests conducted in the Lennox Laboratory air test chamber.

**Refrigeration System** — Factory sealed refrigeration system consists of compressors, condenser coils and direct drive fans, evaporator (dual circuits) coil and blower, expansion valves, sight glasses, high capacity driers, high pressure switches, loss of charge switches, refrigerant lines connected and a full operating charge of refrigerant. Dual independent refrigerant circuits provide staging control to fit varying cooling loads. Lennox augments its reliable operating components with a full complement of standard comfort and safety controls.

**Durable Cabinet** — Rugged leaktight cabinet is constructed of heavy gauge galvanized steel. Cabinet is subject to a five station metal wash process resulting in a perfect bonding surface for a paint finish of powder enamel, electrostatically bonded to the metal. Base section and cabinet panels exposed to conditioned air are lined with thick fiberglass insulation. Insulation is sandwiched between the panel and a galvanized steel panel liner protecting the insulation indefinitely. Large removable panels allow complete service access. Electrical inlets are provided in the cabinet for wiring entry. Wiring junction box and control boxes with all controls factory installed are conveniently located for service access. Lifting brackets are furnished for ease of handling and rigging. Drainage holes in base rails provide moisture removal. Evaporator coil section drain connections are located on both sides of cabinet.

**Copper Tube Evaporator and Condenser Coils** — Extra large surface area and circuiting of coils provide maximum cooling efficiency, excellent heat transfer and low air resistance. Coils are constructed of precisely spaced ripple-edged aluminum fins fitted to durable copper tubes. Fins are equipped with collars that grip tubing for maximum contact area. Flared shoulder tubing connections and silver soldering provide tight, leakproof joints. Long life copper tubing is easy to field service. Coil is thoroughly factory tested under high pressure to insure leakproof construction. The evaporator coil is face split with two separate circuits. Each circuit has its separate expansion valve, compressor and refrigerant charge.

**Efficient Condenser Fans** — Two direct drive fans draw large air volumes uniformly through dual condenser coils and discharges it vertically, up and away from the building. Fan orifice design and low fan tip speed keeps operating sound level at a minimum. Uniform air flow through the coils results in high refrigerant cooling capacity. Permanently lubricated, overload protected fan motor is totally enclosed for maximum protection from rain, dust and corrosion. A rain shield on the motor provides additional protection from moisture. Motor is resiliently mounted. Corrosion resistant polyvinyl chloride (PVC) coated steel wire fan guards are furnished.

**Powerful Dual Supply Air Blowers** — Twin belt drive centrifugal blowers deliver large air volume efficiently and with minimum power consumption. Blower assembly is mounted to rugged angle iron frame with the entire blower and frame assembly vibration isolated on rubber mounts. Ball bearings are permanently sealed and lubricated. Blower wheel is statically and dynamically balanced. Design of motor mounting base permits quick and simple motor changeover, belt tension adjustment or belt changing. A choice of motor outputs and drives is available. Adjustable motor pulley allows for variable speed adjustments. Motor is overload protected. See Blower Drive Selection table for motors and drives available.

**Air Filters** — 25mm (one inch) thick frame type throwaway filters are furnished as standard. Fiberglass media is oil impregnated for increased efficiency. Filters are readily accessible for quick and simple replacement. Filter rack is designed to accept 51mm (two inch) thick filters.

**Optional Electric Heat** — Available factory or field installed. Helix wound nichrome heating elements are exposed directly in the air stream resulting in instant heat transfer, lower coil temperatures and long service life. Elements are accurately located and insulated from the heavy gauge steel support frame by high quality insulators. Time delays bring the elements on and off the line in sequence and equal increments in response to demand with a time delay between each element. Elements are equipped with discharge air limit control and backup replaceable limits providing positive protection in case of overheating.

**Optional Hot Water Heat** — A factory installed hot water coil is equipped with a three-way modulating valve. Factory installed freeze-stat activates valve to circulate water during freezing conditions. A glycol solution may also be used in the system to provide freeze protection. Lennox designed and built coil has large face area, excellent heat transfer and low air resistance. Constructed of precisely spaced ripple-edged aluminium fins fitted to durable copper tubes. Durable copper tubing assures long service life and easy servicing. Each joint is silver soldered and coil is factory tested under pressure to insure leakproof construction.

**Optional Low Ambient Control Kit** — System will operate satisfactorily down to 10°C (50°F) outdoor air temperature without additional controls. If air conditioning operation is required at low ambients a field installed Low Ambient Kit (LB-57113BB) can be added enabling the unit to operate down to minus 18°C (0°F).

**Optional REMD11M Economizer Dampers** — Available factory or field installed. Lennox economizer system consists of: mechanically linked outdoor air and recirculated air dampers. Damper blades are gasketed for tight seal and quiet operation. Formed damper blades rotate smoothly in nylon bearings. The positioning of these dampers is accomplished by a 24 volt fully modulating spring return damper motor with adjustable minimum position potentiometer and controlled by the room thermostat, electronic discharge air sensor and solid-state adjustable outdoor air enthalpy control. An outdoor air hood with rain eliminator vanes is furnished and field installs over the outdoor air dampers external to the unit. For field installation the two damper sections slide in cavities provided in the unit cabinet. Economizer is shipped factory wired and only requires plug-in field connection. The enthalpy control allows for 0 to 100% outdoor air (first stage of cooling) to be used for "free cooling" when outdoor humidity and temperature are acceptable. Additionally, an integrated economizer cycle can be accomplished by allowing the outside air dampers to remain open, continuing to admit outside air, and cycling the compressors to provide dehumidification and additional cooling as needed. The integrated economizer cycle uses only the amount of mechanical cooling necessary.

**Optional Differential Enthalpy Control** — A solid-state return air enthalpy sensor is available to be used in conjunction with the outdoor air enthalpy control to determine which air has the lowest enthalpy. The air with the lowest enthalpy will be selected. Return air enthalpy sensor (54G44) field installs in the economizer damper section and must be ordered extra.

**Optional GED11 Gravity Exhaust Air Dampers** — Dampers field install in space provided in the unit. Pressure operated extruded aluminum dampers rotate smoothly in nylon bearings. Damper blades are equipped with gaskets for tight seal and quiet operation.

**Optional PED11 Power Exhaust Dampers** — Field installs in space provided in the unit cabinet. Fans provide system pressure relief and are interlocked to run when return air dampers are closed and supply air blowers are operating. Motors are overload protected. Pressure operated extruded aluminum dampers ride in nylon bearings and are equipped with seal gaskets resulting in tight seal and quiet operation. Dampers prevent blow-back and outdoor air infiltration during off cycle.

**Optional OAD11 Minimum Fresh Air Dampers** — Damper section complete with cleanable polyurethane air filter field installs external to the unit cabinet. Available for manual or automatic operation. Damper assembly allows a fixed amount of outdoor air into the system and can be adjusted for air quantities up to 25%. Automatic damper operation is available with the addition of a spring return 3 position damper actuator. Actuator only requires plug-in connection for operation. Order Automatic Fresh Air Damper Kit 88G13.

**Optional RMF11 Standard Roof Mounting Frame** — Sturdy mounting frame mates to the unit and provides an automatic weather sealed rooftop installation. Shipped knocked down for ease of shipping and handling it is easily field assembled. A nailer strip is secured to the frame sides to facilitate flashing. Approved by the U.S. National Roofing Contractors Association.

## FEATURES

**Optional RMFH11 Horizontal Roof Mounting Frame** — Frame mates to CHA11 unit and provides horizontal end supply and return air (over/under) duct connection. Supply air connection is in end of frame. Return air connection is made at evaporator section end of unit. Shipped knocked down for ease of shipping and handling; it is easily field assembled. See dimension drawing and air pattern illustration.

**Optional SP11 Remote Status Panel** — The operation of the unit can be checked at a glance on the Remote Status Panel (12F83) conveniently located within the conditioned area. Signal lights on the panel indicate "Cool Mode", "Heat Mode", "Compressor 1", "Compressor 2", "No Heat" and "Filter". The Cool Mode signal light is green when lit and indicates economizer damper operation or DX cooling operation for units without the economizer. Heat Mode light is green and reflects heating operation. Compressor 1 and Compressor 2 lights are green when operating and will turn red if there is an operational malfunction. The No Heat and Filter lights will show red and indicate a requirement for service. Additionally, panel is equipped with a system selector switch (Off — Heat — Auto — Cool — Emergency Heat) (Heat Pump Only), fan switch (Auto — On) and after hours timer. Fan switch provides a choice of intermittent (Auto) or continuous (On) blower operation. Manually operated after hours timer (0 to 12 hours) overrides night setback controls providing normal operation for time period set. A momentary push button switch is used to initiate the timer period. The following field installed controls are required for use with the status panel and must be ordered extra. Filter Switch Kit (97C85) is required for operation of the filter light. Status Panel Readout Relay Kit (88G28) is required to interface status panel with unit operation.

**Optional SSP11 Remote Switching Status Panel** — The operation of the unit can be controlled and observed on the Switching Status Panel (12F84) conveniently located within the conditioned area. Signal lights on the panel indicate "Cool Mode", "Heat Mode", "Compressor 1", "Compressor 2", "No Heat" and "Filter". The Cool Mode signal light is green when lit and indicates economizer damper operation or DX cooling operation for units without the economizer. Heat Mode light is green and reflects heating operation. Compressor 1 and Compressor 2 lights are green when operating and will turn red if there is an operational malfunction. The No Heat and Filter lights will show red and indicate a requirement for service. Additionally, panel is equipped with a system selector switch (Off — Heat — Auto — Cool — Emergency Heat) (Heat Pump Only), fan switch (Auto — On) and after hours timer. Fan switch provides a choice of intermittent (Auto) or continuous (On) blower operation. Manually operated after hours timer (0 to 12 hours) overrides night setback controls providing normal operation for time period set. A momentary push button switch is used to initiate the timer period. The following field installed controls are required for use with the status panel and must be ordered extra. Filter Switch Kit (97C85) is required for operation of the filter light. Status Panel Readout Relay Kit (88G28) is required to interface status panel with unit operation.

## CONTROL SYSTEM OPTIONS

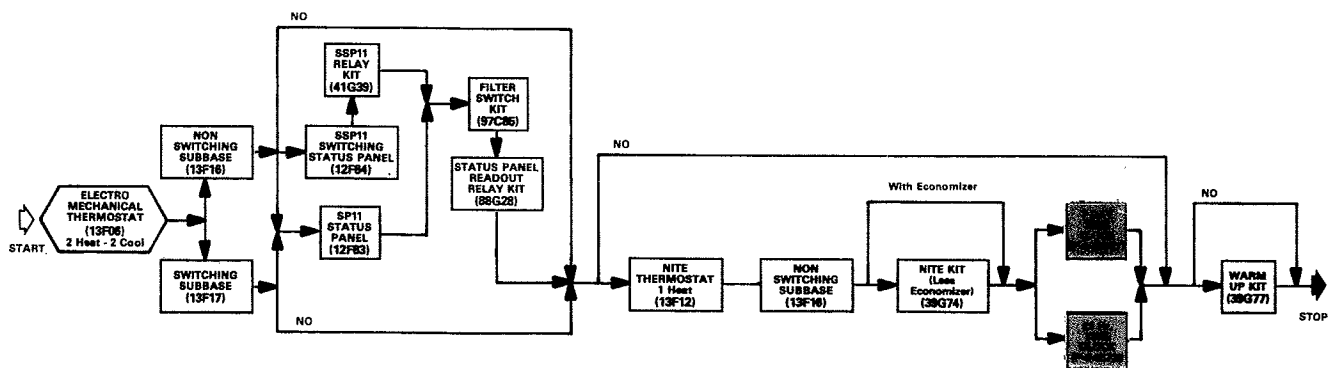
**Optional Electro-Mechanical Thermostat and Control System** — The thermostat and related controls of this system must be ordered extra for field installation. Two stage heat and two stage cool thermostat (13F06) with dual temperature selector levers. Uses subbase (13F17) with manual system switch (Off-Heat-Auto-Cool) and fan switch (Auto-On) or non-switching subbase (13F16). SP11 Remote Status Panel (12F83) or SSP11 Remote Switching Status Panel (12F84) is available for observing and controlling unit operation from the conditioned area. A SSP11 Relay Kit (41G39) is required for switching functions of the Switching Status Panel. Kit must be ordered extra and field installed. For nite operation the following are available. Single stage heating thermostat (13F12) and non-switching subbase (13F16). For applications without the economizer a Nite Kit (39G74), containing a plug-in relay, is required to override the operation of day thermostat. Two time clocks are available for the system, both have nickel cadmium battery to provide approximately 150 hours running reserve during periods of supply failure or disconnection. The 24-hour model (P-8-65726) can give minimum switching periods of 30 minutes and is normally supplied with 4 pairs of tappets. The 7-day model (P-8-65727) can provide a minimum switching period of 3 hours and is normally

supplied with 9 pairs of tappets. Day omission is achieved on 7-day dial by omitting tappets. Also available is a Warm Up Kit (39G77) which holds the economizer outdoor air dampers closed during nite heat operation. Control Relay (63G87) is required to hold dampers closed during morning warm up. See Flow Chart.

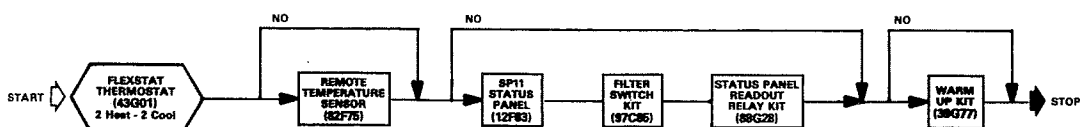
**Optional FLEXSTAT Thermostat and Control System** — The thermostat and related controls of this system must be ordered extra for field installation. Flexstat programmable thermostat (43G01) has touch sensitive keyboard, automatic switching from heat to cool, °C or °F readout, no anticipator, zero droop, indicator lights, hour/day programming, override capabilities, time readout, stage status indicators, operational mode symbols and battery back-up. A Remote Temperature Sensor (82F75) can be adapted to the thermostat for applications where it is desirable to locate the thermostat out of the conditioned area. SP11 Remote Status Panel (12F83) is available for checking unit operation from within the conditioned area. Also available is a Warm Up Kit (39G77) which holds the economizer outdoor air dampers closed during nite heat operation and morning warm up. See Flow Chart

### TEMPERATURE CONTROL SELECTION FLOW CHART

#### OPTIONAL ELECTRO-MECHANICAL THERMOSTAT CONTROL SYSTEM



#### OPTIONAL FLEXSTAT THERMOSTAT CONTROL SYSTEM



## SPECIFICATIONS

Model Number		CHA11-1853	CHA11-2753	
*At ARI Standard 360 Test Conditions	Total cooling capacity — kW (Btuh)	48.2 (164 500)	64.6 (220 300)	
	Total power input — kW	19.6	25.9	
	Coefficient of Performance — (Output/Input)	2.45	2.5	
	Energy Efficiency Ratio — Btuh/Watt	8.4	8.5	
	Dehumidifying capacity	22%	22%	
Refrigerant (22) charge		Stage 1	3.7 kg (8 lbs. 2 oz.)	8.6 kg (19 lbs. 0 oz.)
		Stage 2	8.2 kg (18 lbs. 0 oz.)	9.3 kg (20 lbs. 8 oz.)
Evaporator Blower	Blower wheel nominal diameter x width — mm (in.)	381 x 229 (15 x 9)	381 x 381 (15 x 15)	
	Motor output — kW (hp) (minimum-maximum)	3.7 (5)	3.7 — 5.6 (5 — 7-1/2)	
Evaporator Coil	Net face area — m <sup>2</sup> (sq. ft.)	1.60 (17.2)	2.18 (23.5)	
	Tube outside diameter — mm (in.) — Rows	13 (1/2) — 3	13 (1/2) — 3	
	Fins per m (fins per inch)	512 (13)	591 (15)	
Condenser Coil	Net face area — m <sup>2</sup> (sq. ft.)	2.96 (31.9)	3.61 (38.9)	
	Tube outside diameter — mm (in.) — Rows	(1) 9.5 (3/8) — 3 (1) 9.5 (3/8) — 4	9.5 (3/8) — 4	
	Fins per m (fins per inch)	787 (20)	787 (20)	
Condenser Fans	Diameter — mm (in.) — Blades	(1) 610 (24) — 4 (1) 660 (26) — 5	(2) 660 (26) — 5	
	Air volume — m <sup>3</sup> /s (cfm)	4.37 (9250)	5.27 (11 200)	
	Motor output — watts (hp)	(1) 373 (1/2) (1) 560 (3/4)	(2) 560 (3/4)	
	Total motor input — watts	1100	1225	
Condensate drain connections — female pipe thread — mm (in.)		(2) 32 (1-1/4)	(2) 32 (1-1/4)	
Number and size of filters — mm (in.)		(9) 406 x 508 x 25 (16 x 20 x 1)	(11) 406 x 508 x 25 (16 x 20 x 1)	
Net weight of basic unit — kg (lbs.) (1 Package)		1043 (2300)	1315 (2900)	
Optional Electric Heat Model Number		ECH11-185	ECH11-275	
Optional Hot Water Coil	Model Number and net weight		HWC11-185 (54 kg) (120 lbs.)	HWC11-275 (59 kg) (130 lbs.)
	**Heating capacity — kW (Btuh)		104 (355 000)	130 (445 000)
	Net face area — m <sup>2</sup> (sq. ft.)		0.92 (9.9)	1.04 (11.2)
	Tube outside diameter — mm (in.) — Rows		13 (1/2) — 2	13 (1/2) — 2
	Fins per m (fins per inch)		630 (16)	630 (16)
	Connections — outside diameter — mm (in.)		41.3 (1-5/8) sweat	41.3 (1-5/8) sweat
Optional Roof Mounting Frame — (Net weight)		Standard	RMF11-185 (120 kg) (265 lbs.)	RMF11-275 (143 kg) (315 lbs.)
		Horizontal	RMFH11-185 (170 kg) (375 lbs.)	RMFH11-275 (200 kg) (440 lbs.)
Optional Economizer and Controls — (Net weight)		REMD11M-185. 107kg (235lbs.)	REMD11M-185. 107kg (235lbs.)	
Optional Gravity Exhaust Dampers — (Net weight)		GED11-185 (11 kg) (25 lbs.)	GED11-275 (14 kg) (30 lbs.)	
Optional Power Exhaust Dampers	Model Number — (Net weight)		PED11-185 (50 kg) (110 lbs.)	PED11-275 (68 kg) (150 lbs.)
	Exhaust Fans	Diameter — mm (in.) — Blades	(2) 457 (18) — 5	(3) 457 (18) — 5
		Total air volume — m <sup>3</sup> /s (cfm)	2.0 (4200)	2.8 (5900)
		Motor output — watts (hp)	(2) 187 (1/4)	(3) 187 (1/4)
		Total motor input — watts	610	915
Optional Combination Ceiling Supply and Return Diffusers (Net weight)		Step-down	RTD11-185 (178 kg) (392 lbs.)	RTD11-275 (183 kg) (403 lbs.)
		Flush	FD11-185 (131 kg) (289 lbs.)	FD11-275 (165 kg) (363 lbs.)
		Transitions	SRT11-185 (32 kg) (70 lbs.)	SRT11-275 (36 kg) (80 lbs.)
Optional Fresh Air Damper & Filter Size — mm (in.) — (Net weight)		OAD11-185 (41 kg) (90 lbs.) 1 — 635 x 686 x 25 (25 x 27 x 1)	OAD11-275 (51 kg) (115 lbs.) 1 — 660 x 787 x 25 (26 x 31 x 1)	
Optional Automatic OAD11 Damper Kit — (Net weight)		88G13. 7kg (15lbs.)	88G13. 7kg (15lbs.)	

\* Rated at Air-Conditioning and Refrigeration Institute (ARI) Standard 360 test conditions; 60 L/s evaporator air volume per kW of cooling (450 cfm per ton), 35°C (95°F) outdoor air temperature, 27°C (80°F) dry bulb and 19.4°C (67°F) wet bulb entering evaporator air.

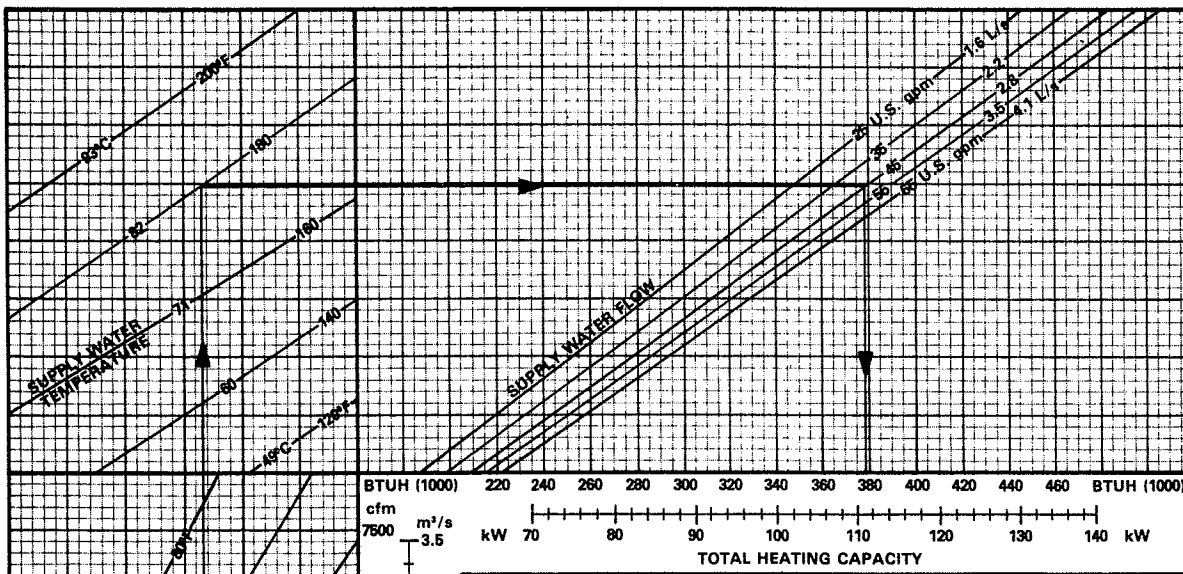
\*\* Rated at 82°C (180°F) supply water temperature, 21°C (70°F) entering air temperature, 11°C (20°F) water temperature drop and 60 L/s air volume per kW of cooling capacity (450 cfm per ton). See hot water capacity curves indexed in this bulletin for heating capacities at other conditions.



## OPTIONAL ELECTRIC HEAT DATA

Unit Model Number	Electric Heat Model Number and Shipping Weight	Number of Elements	Number of Steps	Volts Input	Heating Capacity	
					kW	Btuh
CHA11-1853	ECH11-185-20 61 kg (135 lbs.)	2	1	380	12.5	42 700
				400	13.9	47 400
				415	15.0	51 200
	ECH11-185-30 61 kg (135 lbs.)	2	1	380	18.8	64 200
				400	20.8	71 000
				415	22.4	76 400
	ECH11-185-45 66 kg (145 lbs.)	3	2	380	28.2	96 200
				400	31.3	106 800
				415	33.6	114 600
	ECH11-185-60 66 kg (145 lbs.)	4	2	380	37.6	128 300
				400	41.7	142 300
				415	45.0	153 500
	ECH11-185-75 70 kg (155 lbs.)	5	3	380	47.0	160 400
				400	52.1	177 800
				415	56.1	191 400
CHA11-2753	ECH11-275-30 61 kg (135 lbs.)	2	1	380	18.8	64 200
				400	20.8	71 000
				415	22.4	76 400
	ECH11-275-45 66 kg (145 lbs.)	3	2	380	28.2	96 200
				400	31.3	106 800
				415	33.6	114 600
	ECH11-275-60 66 kg (145 lbs.)	4	2	380	37.6	128 300
				400	41.7	142 300
				415	45.0	153 500
	ECH11-275-75 70 kg (155 lbs.)	5	3	380	47.0	160 400
				400	52.1	177 800
				415	56.1	191 400
	ECH11-275-90 70 kg (155 lbs.)	6	3	380	56.4	192 400
				400	62.1	211 900
				415	67.3	229 600

### CHA11-1853 (HWC11-185) HOT WATER HEATING CAPACITY



Water Temperature Drop (°C) =  $\frac{\text{kW}}{4.19 \times \text{L/S (water)}}$

Air Temperature Rise (°C) =  $\frac{\text{kW}}{1.2 \times \text{m}^3/\text{s (air)}}$

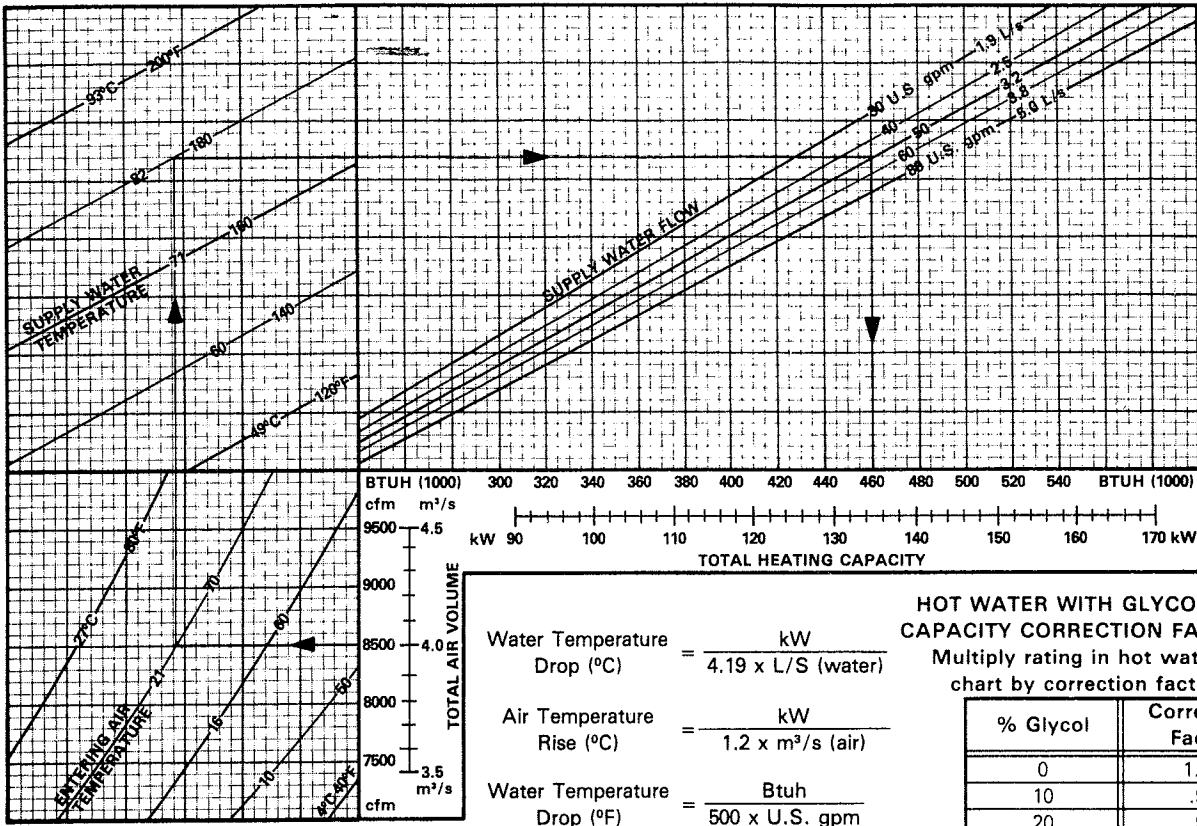
Water Temperature Drop (°F) =  $\frac{\text{Btuh}}{500 \times \text{U.S. gpm}}$

Air Temperature Rise (°F) =  $\frac{\text{Btuh}}{1.08 \times \text{cfm}}$

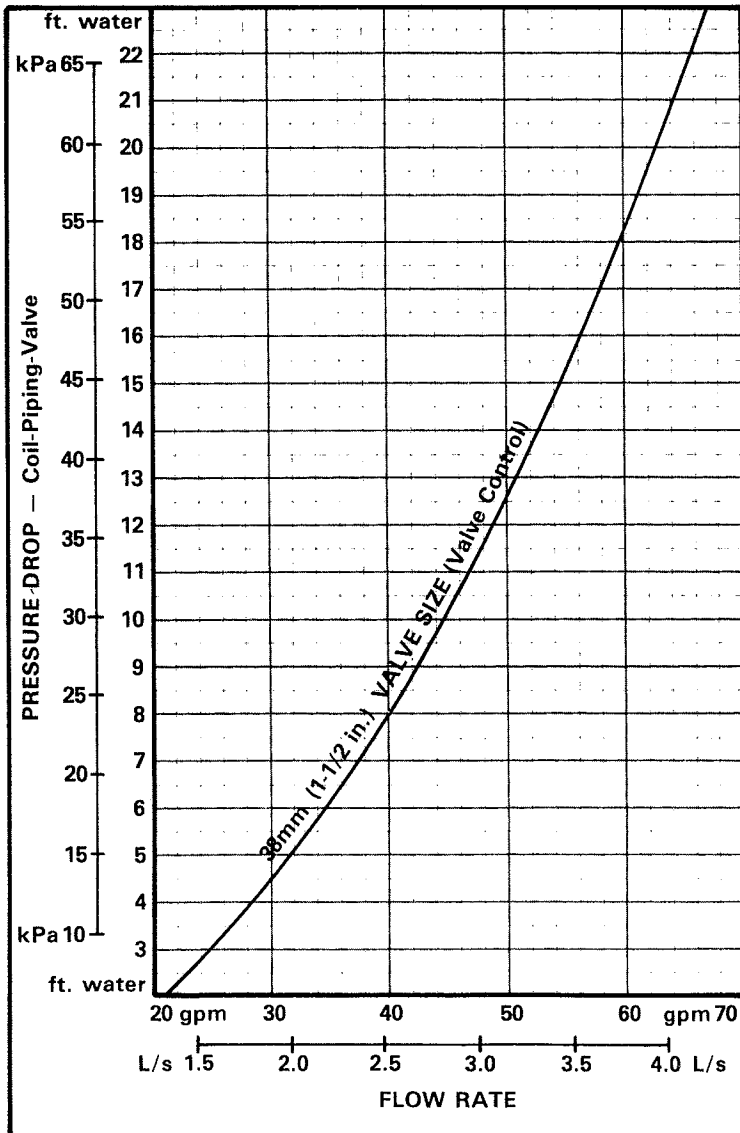
**HOT WATER WITH GLYCOL SOLUTION CAPACITY CORRECTION FACTOR CHART**  
 Multiply rating in hot water capacity chart by correction factor below.

% Glycol	Correction Factor
0	1.00
10	.97
20	.94
30	.91
40	.87
50	.84

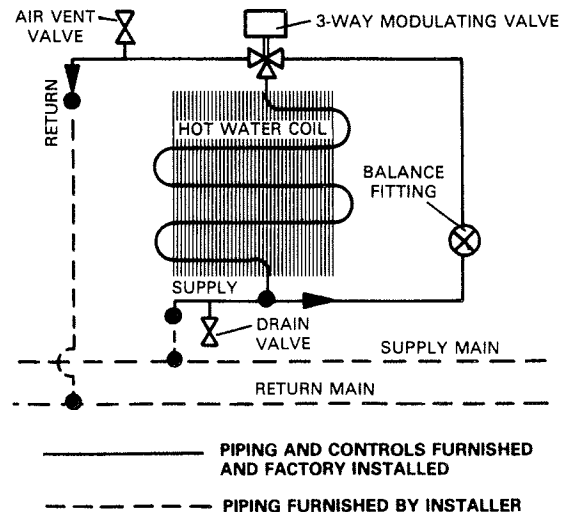
# CHA11-2753 (HWC11-275) HOT WATER HEATING CAPACITY



## HOT WATER COIL PRESSURE DROP



## MODULATING VALVE CONTROL SYSTEM PIPING



**ACCESSORY AIR RESISTANCE**

Model Number	Air Volume		*Total Air Resistance — Pa (inches water gauge)					
			REMD11M Economizer	RTD11 Diffuser			FD11 Diffuser	Electric Heater All Models
	m <sup>3</sup> /s	cfm		2 Sides Open	3 Sides Open	4 Sides Open		
CHA11-1853	2.45	5200	10 (0.041)	144 (0.58)	117 (0.47)	104 (0.42)	75 (0.30)	10 (0.04)
	2.55	5400	10 (0.042)	154 (0.62)	127 (0.51)	112 (0.45)	82 (0.33)	10 (0.04)
	2.65	5600	10 (0.043)	164 (0.66)	137 (0.55)	119 (0.48)	90 (0.36)	10 (0.04)
	2.75	5800	11 (0.044)	174 (0.70)	147 (0.59)	127 (0.51)	97 (0.39)	12 (0.05)
	2.85	6000	11 (0.045)	189 (0.76)	157 (0.63)	137 (0.55)	104 (0.42)	12 (0.05)
	2.95	6200	12 (0.047)	199 (0.80)	169 (0.68)	147 (0.59)	114 (0.46)	12 (0.05)
	3.00	6400	12 (0.048)	214 (0.86)	179 (0.72)	157 (0.63)	124 (0.50)	12 (0.05)
	3.10	6600	12 (0.050)	229 (0.92)	191 (0.77)	167 (0.67)	134 (0.54)	15 (0.06)
	3.20	6800	13 (0.052)	246 (0.99)	206 (0.83)	179 (0.72)	144 (0.58)	15 (0.06)
	3.30	7000	13 (0.054)	259 (1.04)	216 (0.98)	189 (0.76)	154 (0.62)	15 (0.06)
CHA11-2753	3.40	7200	14 (0.056)	271 (1.09)	229 (0.92)	199 (0.80)	164 (0.66)	15 (0.06)
	3.30	7000	9 (0.035)	104 (0.42)	82 (0.33)	77 (0.31)	92 (0.37)	17 (0.07)
	3.40	7200	9 (0.036)	112 (0.45)	90 (0.36)	82 (0.33)	97 (0.39)	17 (0.07)
	3.50	7400	9 (0.037)	119 (0.48)	97 (0.39)	87 (0.35)	102 (0.41)	17 (0.07)
	3.60	7600	9 (0.038)	127 (0.51)	104 (0.42)	92 (0.37)	107 (0.43)	17 (0.07)
	3.70	7800	10 (0.039)	137 (0.55)	114 (0.46)	99 (0.40)	117 (0.47)	20 (0.08)
	3.80	8000	10 (0.041)	147 (0.59)	122 (0.49)	107 (0.43)	124 (0.50)	20 (0.08)
	3.85	8200	11 (0.043)	157 (0.63)	132 (0.53)	114 (0.46)	132 (0.53)	20 (0.08)
	3.95	8400	11 (0.045)	167 (0.67)	139 (0.56)	122 (0.49)	139 (0.56)	22 (0.09)
	4.05	8600	12 (0.047)	177 (0.71)	149 (0.60)	129 (0.52)	147 (0.59)	22 (0.09)
	4.15	8800	12 (0.048)	189 (0.76)	157 (0.63)	137 (0.55)	157 (0.63)	25 (0.11)
	4.25	9000	12 (0.050)	196 (0.79)	167 (0.67)	144 (0.58)	164 (0.66)	25 (0.11)
	4.35	9200	13 (0.052)	209 (0.84)	174 (0.70)	152 (0.61)	172 (0.69)	27 (0.11)
	4.45	9400	13 (0.054)	216 (0.87)	182 (0.73)	159 (0.64)	179 (0.72)	27 (0.11)

\*Air Resistance shown must be added to system static pressure when selecting blower speed and motor output requirements.  
NOTE — Diffuser Air Resistance includes grille and 90 cm (3 ft.) of ductwork.

**BLOWER DATA**

**CEILING DIFFUSER AIR THROW DATA**

Model Number	Air Volume		*Effective Throw Range			
			RTD11 Step Down		FD11 Flush	
	m <sup>3</sup> /s	cfm	meters	feet	meters	feet
CHA11-1853	2.45	5200	13.1 - 15.8	43 - 52	14.0 - 15.8	46 - 52
	2.85	6000	13.7 - 16.5	45 - 54	14.6 - 16.8	48 - 55
	3.20	6000	14.3 - 17.1	47 - 56	15.2 - 17.7	50 - 58
CHA11-2753	3.30	7000	13.1 - 15.8	43 - 52	15.5 - 18.3	51 - 60
	3.80	8000	13.7 - 16.5	45 - 54	16.2 - 18.9	53 - 62
	4.25	9000	14.3 - 17.1	47 - 56	16.8 - 19.5	55 - 64

\*Four sides open and terminating at a point where conditioned air velocity has decreased to 0.25 m/s (50 feet per minute).

**BLOWER DRIVE SELECTION**

Using total air volume and system Static Pressure External to Unit requirements, determine from Blower Performance Chart rev/min and blower motor output required for job. The correct motor and pulleys will be factory installed. The following table lists blower motor output and blower speed range of drives available with each motor.

Model Number	*Nominal Motor Output		Blower Speed (rev/min) at 1440 rev/min Motor Speed
	kW	hp	
CHA11-1853	3.7	5	845 - 995
CHA11-2753	3.7	5	750 - 905
	5.6	7-1/2	890 - 1070

\* Service Factor = 1.15

**POWER EXHAUST FANS PERFORMANCE**

**CHA11-1853**

Air Volume Exhausted		Return Air System Static Pressure	
m <sup>3</sup> /s	cfm	Pa	inches water gauge
2.00	4200	0	0
1.80	3800	12	.05
1.60	3400	25	.10
1.40	3000	37	.15
1.25	2600	50	.20
0.80	1700	62	.25

**CHA11-2753**

Air Volume Exhausted		Return Air System Static Pressure	
m <sup>3</sup> /s	cfm	Pa	inches water gauge
2.80	5900	0	0
2.50	5300	12	.05
2.20	4700	25	.10
1.95	4100	37	.15
1.60	3400	50	.20
1.20	2500	62	.25



# BLOWER DATA

## CHA11-1853 BLOWER PERFORMANCE

Air Volume m <sup>3</sup> /s (cfm)	STATIC PRESSURE EXTERNAL TO UNIT — Pa (Inches Water Gauge)											
	50 (.20)	75 (.30)	100 (.40)	125 (.50)	150 (.60)	175 (.70)	200 (.80)	225 (.90)	250 (1.0)	325 (1.30)	375 (1.50)	
	Rev/ min. (hp)	kW (hp)	Rev/ min. (hp)	kW (hp)	Rev/ min. (hp)	kW (hp)	Rev/ min. (hp)	kW (hp)	Rev/ min. (hp)	kW (hp)	Rev/ min. (hp)	kW (hp)
2.45 (5200)	580 (1.12)	625 (1.30)	665 (1.45)	700 (1.64)	730 (1.78)	760 (1.90)	785 (2.05)	815 (2.16)	845 (2.35)	930 (2.83)	1000 (3.43)	
2.55 (5400)	590 (1.19)	640 (1.42)	675 (1.60)	715 (1.75)	740 (1.86)	770 (2.00)	800 (2.16)	825 (2.31)	855 (2.54)	940 (3.10)	1010 (3.50)	
2.65 (5600)	605 (1.30)	650 (1.50)	685 (1.70)	725 (1.86)	750 (2.05)	785 (2.16)	810 (2.31)	840 (2.50)	865 (2.68)	950 (3.28)	1020 (3.65)	
2.75 (5800)	620 (1.45)	660 (1.60)	695 (1.83)	730 (1.94)	760 (2.13)	795 (2.31)	820 (2.46)	850 (2.65)	875 (2.83)	965 (3.47)	1035 (3.80)	
2.85 (6000)	635 (1.57)	675 (1.75)	710 (1.98)	745 (2.09)	775 (2.28)	805 (2.46)	835 (2.65)	865 (2.83)	890 (3.02)	975 (3.66)	1045 (4.03)	
2.95 (6200)	650 (1.72)	690 (2.55)	725 (2.13)	760 (3.00)	790 (3.30)	815 (3.55)	850 (3.80)	875 (4.05)	900 (4.30)	990 (5.15)	1060 (5.70)	
3.00 (6400)	665 (1.87)	705 (2.75)	735 (3.05)	770 (3.25)	800 (3.50)	830 (3.75)	860 (4.05)	890 (4.30)	915 (4.55)	1000 (5.40)	---	
3.10 (6600)	680 (1.98)	720 (2.90)	750 (3.20)	785 (3.45)	815 (3.75)	840 (4.00)	875 (4.30)	900 (4.55)	925 (4.80)	1015 (5.65)	---	
3.20 (6800)	695 (2.09)	730 (3.10)	760 (3.40)	800 (3.70)	830 (4.00)	855 (4.20)	885 (4.55)	915 (4.80)	940 (5.05)	---	---	
3.30 (7000)	710 (2.24)	745 (3.30)	775 (3.60)	810 (3.90)	840 (4.20)	865 (4.45)	900 (4.80)	925 (5.05)	950 (5.30)	---	---	
3.40 (7200)	720 (2.42)	760 (3.50)	790 (3.85)	820 (4.15)	850 (4.45)	880 (4.75)	910 (5.05)	935 (5.30)	960 (5.60)	---	---	

NOTE — Data is measured external to the unit cabinet with the air filter in place. See Page 8 for Accessory Air Resistance data.  
 Legend — Rev/min. = Blower speed required. kW (hp) = Motor output required.

## CHA11-2753 BLOWER PERFORMANCE

Air Volume m <sup>3</sup> /s (cfm)	STATIC PRESSURE EXTERNAL TO UNIT — Pa (Inches Water Gauge)											
	50 (.20)	75 (.30)	100 (.40)	125 (.50)	150 (.60)	175 (.70)	200 (.80)	225 (.90)	250 (1.0)	325 (1.30)	375 (1.50)	
	Rev/ min. (hp)	kW (hp)	Rev/ min. (hp)	kW (hp)	Rev/ min. (hp)	kW (hp)	Rev/ min. (hp)	kW (hp)	Rev/ min. (hp)	kW (hp)	Rev/ min. (hp)	kW (hp)
3.30 (7000)	575 (1.38)	610 (1.64)	640 (1.79)	680 (2.09)	720 (2.31)	760 (2.54)	800 (2.80)	830 (3.05)	870 (3.21)	960 (3.88)	1015 (4.44)	
3.40 (7200)	580 (1.50)	620 (1.75)	655 (1.98)	690 (2.20)	730 (2.39)	770 (2.65)	810 (2.83)	840 (3.00)	875 (3.28)	965 (4.00)	1020 (4.60)	
3.50 (7400)	590 (1.64)	630 (2.50)	670 (2.80)	700 (3.10)	740 (3.40)	780 (3.70)	815 (3.95)	845 (4.15)	880 (4.50)	970 (5.50)	1025 (6.25)	
3.60 (7600)	595 (1.75)	640 (2.60)	680 (2.95)	715 (3.25)	750 (3.55)	785 (3.80)	820 (4.10)	855 (4.35)	890 (4.65)	975 (5.65)	1030 (6.45)	
3.70 (7800)	610 (1.90)	650 (2.80)	690 (3.10)	725 (3.45)	760 (3.70)	790 (3.95)	825 (4.20)	860 (4.50)	895 (4.80)	980 (5.80)	1035 (6.65)	
3.80 (8000)	620 (2.01)	660 (2.95)	700 (3.30)	735 (3.60)	770 (3.85)	800 (4.10)	830 (4.35)	870 (4.65)	900 (4.95)	985 (6.00)	1040 (6.80)	
3.85 (8200)	630 (2.13)	670 (3.10)	710 (3.50)	745 (3.75)	780 (4.00)	810 (4.25)	840 (4.50)	880 (4.85)	910 (5.15)	990 (6.20)	1045 (7.00)	
3.95 (8400)	645 (2.28)	680 (3.30)	720 (3.65)	755 (3.95)	790 (4.15)	815 (4.40)	850 (4.70)	885 (5.05)	915 (5.30)	995 (6.35)	1050 (7.15)	
4.05 (8600)	655 (2.39)	695 (3.45)	730 (3.85)	765 (4.10)	800 (4.35)	825 (4.60)	860 (4.85)	895 (5.25)	920 (5.50)	1000 (6.55)	1055 (7.35)	
4.15 (8800)	670 (2.54)	705 (3.65)	740 (4.00)	775 (4.30)	805 (4.50)	830 (4.75)	865 (5.05)	900 (5.40)	930 (5.65)	1010 (6.70)	1060 (7.50)	
4.25 (9000)	680 (2.65)	715 (3.80)	750 (4.20)	785 (4.45)	815 (4.65)	840 (4.90)	875 (5.20)	910 (5.60)	935 (5.85)	1015 (6.90)	1065 (7.70)	
4.35 (9200)	690 (2.80)	725 (4.05)	760 (4.40)	795 (4.65)	825 (4.85)	850 (5.15)	885 (5.45)	920 (5.80)	945 (6.05)	1020 (7.15)	1070 (7.95)	
4.45 (9400)	700 (2.95)	735 (4.25)	770 (4.60)	800 (4.85)	830 (5.05)	860 (5.35)	895 (5.65)	925 (6.00)	950 (6.30)	1030 (7.40)	1075 (8.20)	

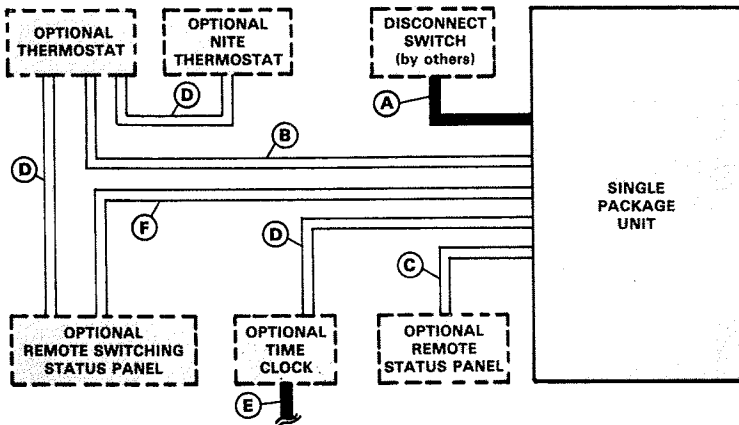
NOTE — Data is measured external to the unit cabinet with the air filter in place. See Page 8 for Accessory Air Resistance data.  
 Legend — Rev/min. = Blower speed required. kW (hp) = Motor output required.

## ELECTRICAL DATA

Model Number		CHA11-1853	CHA11-2753	
Line voltage (50 Hz — 3 phase)		380/420V	380/420V	
Voltage range (minimum — maximum)		342-462V	342-462V	
Compressor 1	Rated load (A)	20.4	20.4	
	Locked rotor (A)	111.0	111.0	
Compressor 2	Rated load (A)	10.0	20.4	
	Locked rotor (A)	63.0	111.0	
Condenser Fan Motors (1 Phase)	Full load (A)	(1) 1.4 and (1) 1.9	(2) 1.9	
	Locked rotor (A)	(1) 3.1 and (1) 3.7	(2) 3.7	
Evaporator Blower Motor	Output — kW (hp)	3.7 (5)	3.7 (5)	5.6 (7-1/2)
	Full load (A)	7.8	7.8	11.8
	Locked rotor (A)	50.0	50.0	79.5
Optional Exhaust Fan Motors (1 Phase)	Full load (A)	(2) 0.7	(3) 0.7	
	Locked rotor (A)	(2) 1.3	(3) 1.3	
Electric Heat Per Element (A)	ECH11-185-20	10.5	----	
	All others	15.7	15.7	

NOTE — Refer to local electrical codes to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 75°C (167°F).

### ELECTRO-MECHANICAL THERMOSTAT CONTROL SYSTEM



- A — Three phase with neutral (See Electrical Data Table)
- B — Six wire 24v
  - Five wire 24v - with SSP11 Switching Status Panel
- C — Nine wire 24v
- D — Two wire 24v
- E — Two wire 24v
- F — Fifteen wire 24v

— Field wiring not furnished —

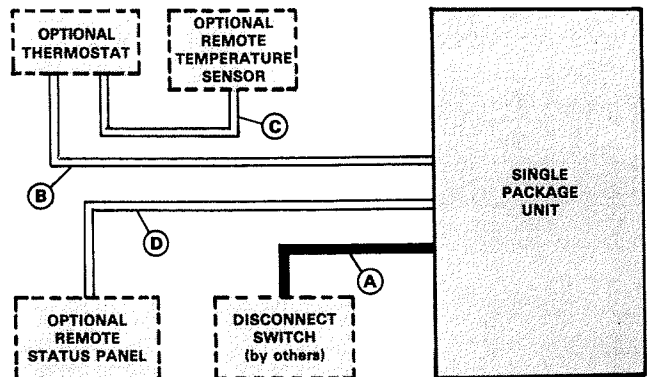
NOTE — All wiring must conform to local electrical codes.

### FLEXSTAT THERMOSTAT CONTROL SYSTEM

- A — Three phase with neutral (See Electrical Data Table)
- B — Seven wire 24v (Flexstat)
- C — Two wire 24v
- D — Nine wire 24v

— Field wiring not furnished —

NOTE — All wiring must conform to local electrical codes.



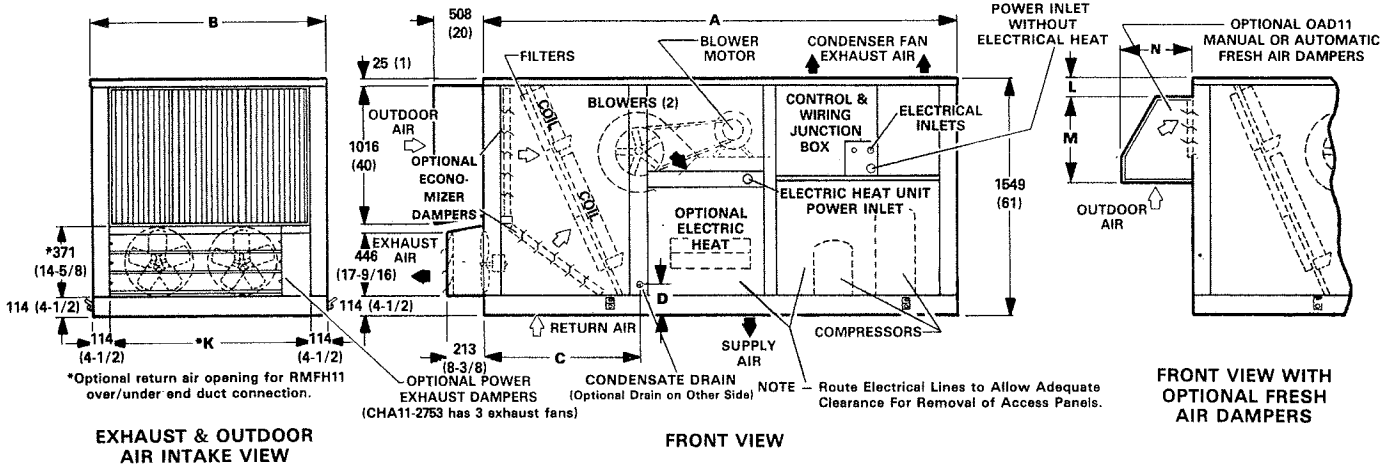
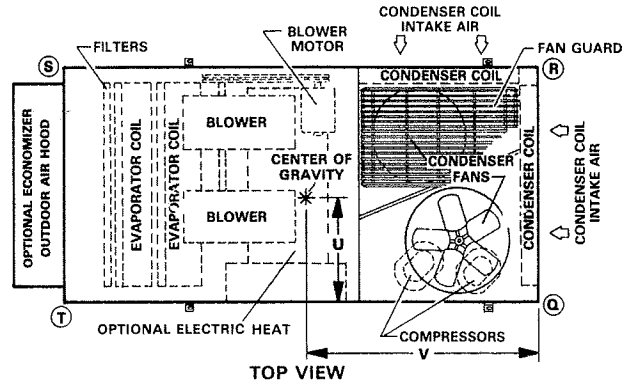
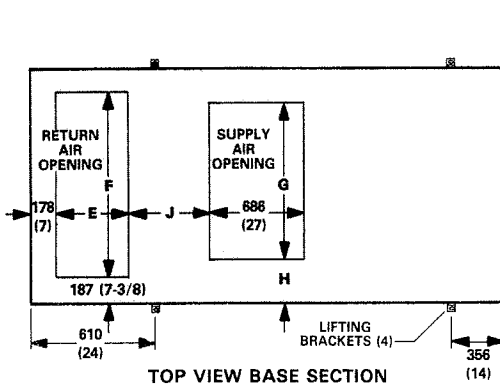
## DIMENSIONS – mm (inches)

### CORNER WEIGHTS

Model Number			Q	R	S	T
CHA11-1853	Basic Unit	kg	303	261	222	257
		lbs.	668	576	489	567
	With Economizer	kg	337	274	241	297
		lbs.	744	605	532	654
CHA11-2753	Basic Unit	kg	357	331	302	326
		lbs.	787	729	665	719
	With Economizer	kg	397	349	328	372
		lbs.	875	770	723	821
	With Economizer/Exhaust Fans	kg	410	361	348	396
		lbs.	904	795	768	873

### CENTER OF GRAVITY

Model Number			U	V
CHA11-1853	Basic Unit	mm	800	1359
		in.	31-1/2	53-1/2
	With Economizer	mm	775	1384
		in.	30-1/2	54-1/2
CHA11-2753	Basic Unit	mm	953	1721
		in.	37-1/2	67-3/4
	With Economizer	mm	927	1746
		in.	36-1/2	68-3/4
	With Economizer/Exhaust Fans	mm	927	1772
		in.	36-1/2	69-3/4



Model Number		A	B	C	D	E	F	G	H	J	K	L	M	N
CHA11-1853	mm	2959	1727	835	211	457	1362	1194	267	489	1365	41	699	565
	in.	116-1/2	68	32-7/8	8-5/16	18	53-5/8	47	10-1/2	19-1/4	53-3/4	1-5/8	27-1/2	22-1/4
CHA11-2753	mm	3607	1981	1041	70	572	1616	1346	318	527	1746	187	845	616
	in.	142	78	41	2-3/4	22-1/2	63-5/8	53	12-1/2	20-3/4	68-3/4	7-3/8	33-1/4	24-1/4

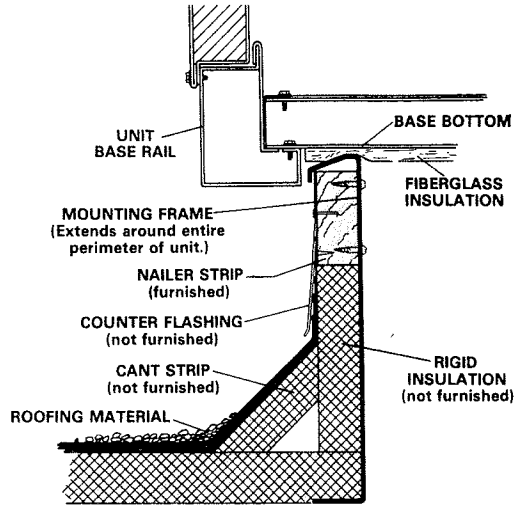
## TYPICAL FLASHING DETAIL FOR RMF11 ROOF MOUNTING FRAME

### ROOF MOUNTING FRAME SPECIFICATIONS.

Roof Mounting Frame is rigid enough to be spanned over its entire length or cantilevered if supported on either side of the center or gravity.

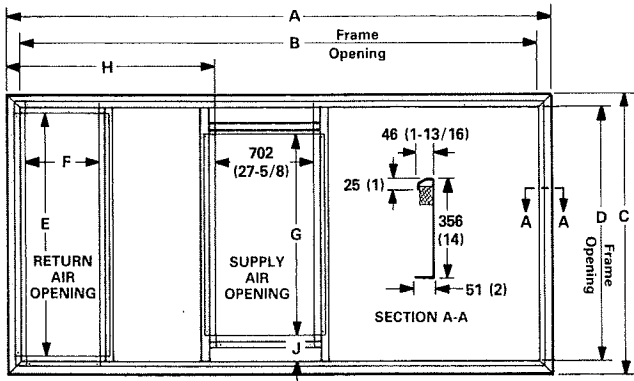
Model Number		RMF11	RMFH11
*Frame moment of inertia (I)	mm <sup>4</sup>	2.83 x 10 <sup>7</sup>	21.52 x 10 <sup>7</sup>
	in. <sup>4</sup>	68	517
*Frame section modulus $\frac{I}{C}$	mm <sup>3</sup>	1.64 x 10 <sup>5</sup>	6.03 x 10 <sup>5</sup>
	in. <sup>3</sup>	10.0	36.8
Mounting frame weight	kg/m	14.6	20.1
	lb./ft.	9.8	13.5
Mounting frame design strength	MPa	138	138
	psi	20 000	20 000

\*Includes both sides of frame.



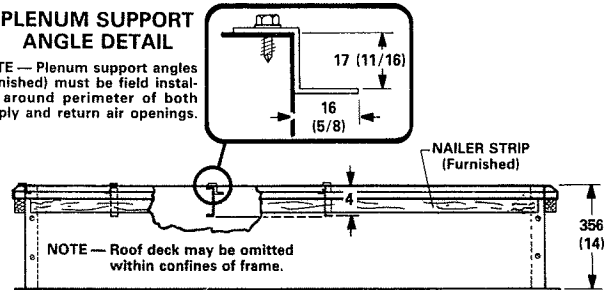
### DIMENSIONS — mm (inches)

#### RMF11 ROOF MOUNTING FRAME WITH DOUBLE DUCT OPENING



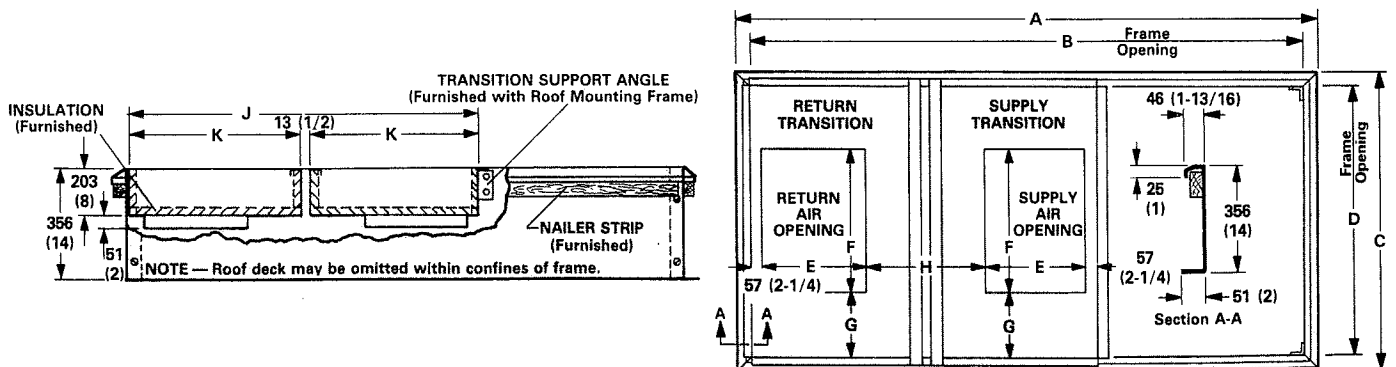
#### PLENUM SUPPORT ANGLE DETAIL

NOTE — Plenum support angles (furnished) must be field installed around perimeter of both supply and return air openings.



Model Number		A	B	C	D	E	F	G	H	J
RMF11-185	mm	2737	2645	1505	1413	1378	473	1210	1030	102
	in.	107-3/4	104-1/8	59-1/4	55-5/8	54-1/4	18-5/8	47-5/8	40-9/16	4
RMF11-275	mm	3386	3294	1759	1667	1632	587	1362	1167	152
	in.	133-5/16	129-11/16	69-1/4	65-5/8	64-1/4	23-1/8	53-5/8	45-15/16	6

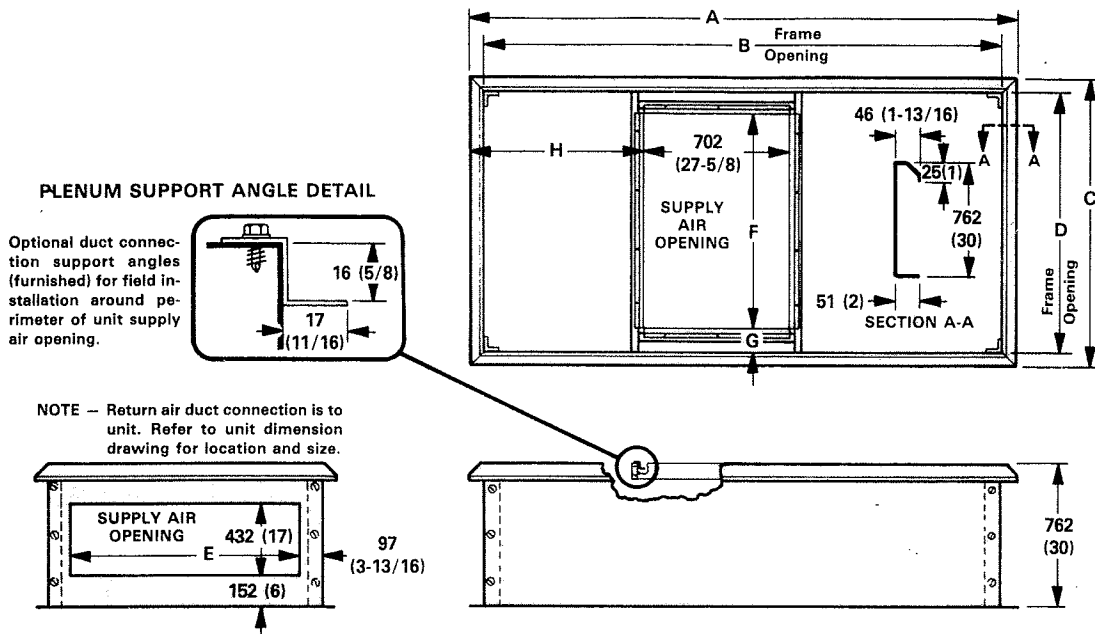
#### RMF11 ROOF MOUNTING FRAME WITH SUPPLY AND RETURN TRANSITIONS FOR FD11 AND RTD11-185 AND 275 DIFFUSERS



Model Number		A	B	C	D	E	F	G	H	J	K
RMF11-185	mm	2737	2645	1505	1413	457	914	249	654	1683	835
	in.	107-3/4	104-1/8	59-1/4	55-5/8	18	36	9-13/16	25-3/4	66-1/4	32-7/8
RMF11-275	mm	3386	3294	1759	1667	610	1219	224	502	1835	911
	in.	133-5/16	129-11/16	69-1/4	65-5/8	24	48	8-13/16	19-3/4	72-1/4	35-7/8

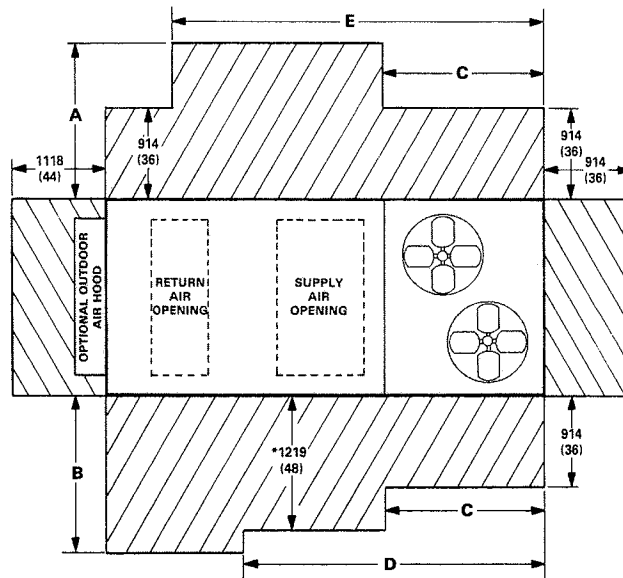
## DIMENSIONS – mm (inches)

### RMFH11 HORIZONTAL ROOF MOUNTING FRAME



Model Number		A	B	C	D	E	F	G	H
RMFH11-185	mm	2737	2645	1505	1413	1219	1210	102	1030
	in.	107-3/4	104-1/8	59-1/4	55-5/8	48	47-5/8	4	40-9/16
RMFH11-275	mm	3386	3294	1759	1667	1473	1362	152	1167
	in.	133-5/16	129-11/16	69-1/4	65-5/8	58	53-5/8	6	45-15/16

### INSTALLATION CLEARANCES – mm (inches)

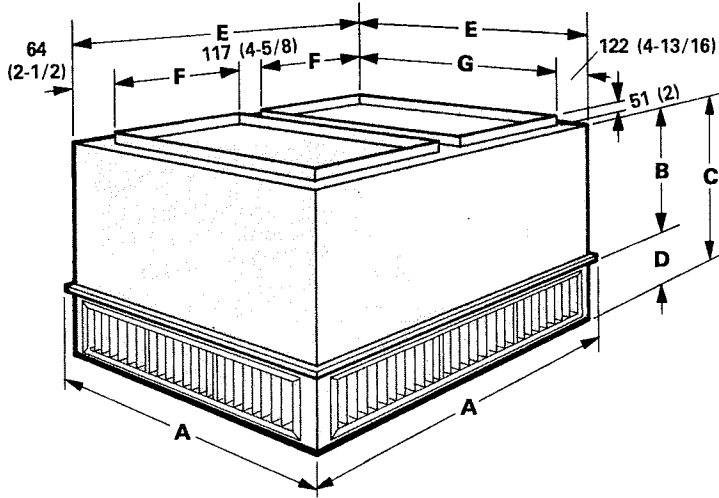


Model Number		A	B	C	D	E
CHA11-1853	mm	1118	1626	1118	2032	2184
	in.	44	64	44	80	86
CHA11-2753	mm	1270	1880	1575	2540	2692
	in.	50	74	62	100	106

# COMBINATION CEILING SUPPLY AND RETURN AIR DIFFUSERS

## DIMENSIONS — mm (inches)

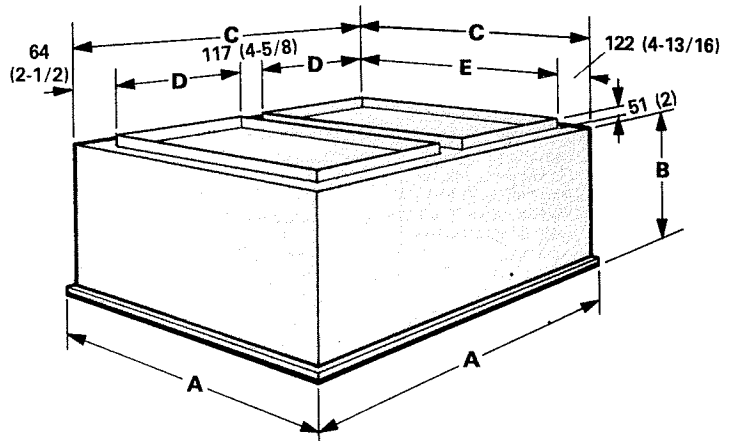
**RTD11-185 AND RTD11-275  
STEP-DOWN CEILING DIFFUSER**



Model Number		A	B	C	D	E	F	G
RTD11-185	mm	1210	600	864	257	1159	457	914
	in.	47-5/8	23-7/8	34	10-1/8	45-5/8	18	36
RTD11-275	mm	1514	727	1016	283	1464	610	1219
	in.	59-5/8	28-7/8	40	11-1/8	57-5/8	24	48

**Optional RTD11 Combination Ceiling Supply and Return Diffuser Assembly** — Step down mount diffuser extends slightly below ceiling level and discharges conditioned air out through grilles on all four sides. Aluminum grilles are fitted with double deflection louvers for precise directional control of air flow. Return air enters through the large center grille. Assembly also includes insulated diffuser box with flanges for ease of duct connection, hanging rings for suspending and interior transition to insure low static and even air flow on all four sides. Transition is sealed internally to prevent recirculation. Diffuser assembly is completely factory assembled. Diffuser readily adapts to T-bar ceiling grids and plaster ceilings.

**FD11-185 AND FD11-275  
FLUSH CEILING DIFFUSER**



Model Number		A	B	C	D	E
FD11-185	mm	1210	765	1159	457	914
	in.	47-5/8	30-1/8	45-5/8	18	36
FD11-275	mm	1514	918	1464	610	1219
	in.	59-5/8	36-1/8	57-5/8	24	48

**Optional FD11 Combination Ceiling Supply and Return Diffuser Assembly** — Flush mount diffuser installs almost flush with the ceiling level and discharges conditioned air out through fixed blade louvers on all four sides. Fixed blade louvers insure that air flow will be evenly distributed. Return air enters through large center grille. Assembly also includes insulated diffuser box with flanges for ease of duct connections, support hanger eyelets at the top corners for secure installation and interior transition to insure low static and even air flow on all four sides. Transition is sealed internally to prevent recirculation. Diffuser assembly is completely factory assembled. Diffuser readily adapts to T-bar ceiling grids and plaster ceilings.

**Optional SRT11 Supply and Return Transitions** — Transitions field install in the RMF11 roof mounting frame and provide segregated and simple duct connections to supply and return diffuser. Completely insulated galvanized steel transitions have flanges for ease of duct connection. Duct from the transitions to the diffuser is not furnished and must be provided by installer. Transitions are completely factory assembled and easily field installed in the roof mounting frame with minimum costs and labor requirements.

## GUIDE SPECIFICATIONS

**Prepared for the guidance of architects, consulting engineers and mechanical contractors.**

**General** — Furnish and install a single package combination air to air direct expansion mechanical cooling system complete with automatic controls. The single package unit shall be a standard product of a firm regularly engaged in the manufacture of heating-cooling equipment.

The installed weight shall not be more than ..... kg (lbs.). Entire unit shall have a width of not more than ..... mm (inches), a depth of not more than ..... mm (inches) and an overall height of not more than ..... mm (inches). The equipment shall be shipped completely factory assembled, precharged, piped and wired internally ready for field connections. In addition, manufacturer shall test operate system at the factory before shipment.

**Air Distribution** — Equipment shall be capable of bottom or end (horizontal) handling of conditioned air. All air distribution ducts shall be fiberglass or galvanized steel insulated with ..... mm (inches) thick ..... kg/m<sup>3</sup> (lb./ft.<sup>3</sup>) density fiberglass or equivalent.

**Cooling System** — The total certified cooling capacity shall not be less than ..... kW (Btuh) with an evaporator air volume of ..... m<sup>3</sup>/s (cfm), an entering wet bulb air temperature of ..... °C (°F), an entering dry bulb air temperature of ..... °C (°F) and a condenser entering temperature of ..... °C (°F). The compressor power input shall not exceed ..... kW at these conditions.

The coils shall be non-ferrous construction with aluminum fins mechanically bonded to durable copper tubes. Coils shall be pressure leak tested. Coil face area shall be not less than ..... m<sup>2</sup> (sq. ft.) (evaporator) and ..... m<sup>2</sup> (sq. ft.) (condenser).

Dual compressors shall be resiliently mounted, have overload protection, internal pressure relief and crankcase heater. The refrigeration system shall have suction and liquid line service gauge ports, sight glasses, high pressure switches, loss of charge switches, driers and full refrigerant charge. Control option available shall consist of low ambient control.

**Cabinet** — Shall be galvanized steel with a paint finish of powdered enamel electrostatically bonded to the metal. Cabinet panels where conditioned air is handled shall be fully insulated to prevent sweating and minimize sound. Openings shall be provided for power connection entry. Base shall have drainage holes. Lifting lugs shall be provided for rigging.

**Additive Electric Heaters** — The certified total heating capacity shall be ..... kW (Btuh) at ..... volts power supply.

Optional electric heaters shall be available. Heating elements shall be nichrome bare wire exposed directly to the air stream. Time delays shall bring the elements on and off in sequence with a time delay between each element. Limit controls shall provide overload and short circuit protection.

**Hot Water Heat** — The certified total heating capacity output shall be ..... kW (Btuh) with a heating coil air volume of ..... m<sup>3</sup>/s (cfm), at water entering temperature of ..... °C (°F), a water flow rate of ..... L/s (U.S. gpm) and an entering air temperature of ..... °C (°F). A three way modulating water valve shall be furnished. The coil shall be non-ferrous construction with aluminum fins mechanically bonded to copper tubes. Factory installed freeze-stat shall provide freeze-up protection. Coil shall be factory pressure leak tested.

**Service Access** — All components, wiring and inspection areas shall be completely accessible through removable panels.

**Supply Air Blowers** — Dual centrifugal supply air blower shall have permanently lubricated ball bearings and adjustable belt drive and motor mount where belt tension can be easily adjusted. The entire assembly shall be floated on resilient rubber mounts. Blower wheel shall be statically and dynamically balanced. Blower shall be capable of delivering ..... m<sup>3</sup>/s (cfm) at an external static pressure of ..... Pa (inches water gauge) requiring ..... kW (hp) motor output and ..... rev/min.

**Condenser Fans** — Twin propeller type condenser fans shall discharge vertically and be direct driven by a ..... kW (hp) output motor. Fan motor shall be totally enclosed with ball bearings, permanently lubricated, inherently protected and equipped with rain shield. Fan shall have a safety guard.

**Air Filters** — 25mm (1 inch) thick disposable frame type fiberglass media filters shall have not less than ..... m<sup>2</sup> (sq. ft.) of free area.

### OPTIONAL ACCESSORIES

**Roof Mounting Frame** — Furnish and install a steel roof mounting frame for bottom or horizontal discharge and return air duct connection. It shall mate to the bottom perimeter of the equipment. When flashed into the roof it shall make a unit mounting curb and provide weatherproof duct connection and entry into the conditioned area. Flashing shall be the responsibility of a roofing contractor.

**Economizer Dampers** — Furnish and install complete with controls an optional mechanically linked air mixing damper assembly including outdoor air and recirculated air dampers. The assembly shall mount within the confines of the unit cabinet and provide for the introduction of outside air for minimum ventilation and free cooling. Outdoor air hood shall mount external to the unit cabinet. Damper motor shall be 24 volt, fully modulating spring return. Controls shall include discharge air sensor, minimum position potentiometer, and solid-state adjustable outdoor air enthalpy control. Control option shall consist of differential enthalpy control (return air sensor).

**Fresh Air Dampers** — Outdoor air damper section shall control outdoor air requirements and be available for manual or automatic operation. Dampers shall be adjustable for air quantities up to 25%. Shall include cleanable air filter.

**Gravity Exhaust Air Dampers** — Pressure operated dampers shall install within the unit. Damper blades shall ride in nylon bearings and be gasketed for tight seal and quiet operation.

**Power Exhaust Air Dampers** — Direct drive propeller type fans shall exhaust air through pressure relief dampers. Motors shall be overload protected. Pressure operated dampers shall install within the unit and prevent blow back and outdoor air infiltration during the fan off cycle. Damper blades shall ride in nylon bearings and be gasketed for tight seal and quiet operation.

**Ceiling Diffusers** — Furnish and install a (flush or stepdown) optional combination ceiling supply and return air diffuser. It shall be capable of not less than ..... m (ft.) radius of effective throw. Supply and return transitions shall be available, for field installation in the roof mounting frame, to provide duct connection to the diffuser.

**Remote Status Panel** — Shall be available for installation within the conditioned area to observe equipment operation. The panel shall include signal lights for Cool Mode, Heat Mode, Compressor 1, Compressor 2, No Heat and Filter.

**Remote Switching Status Panel** — Shall be available for installation within the conditioned area to control and observe equipment operation. The panel shall include signal lights for Cool Mode, Heat Mode, Compressor 1, Compressor 2, No Heat and Filter. System selector switch and fan switch shall provide operational mode and blower operation. After hours timer switch shall override night setback controls and provide normal operation for time period set.

**Control Systems** — Shall provide a selection of optional thermostats and related controls to automatically operate the mechanical equipment through the heating or cooling and ventilating cycles as required.

