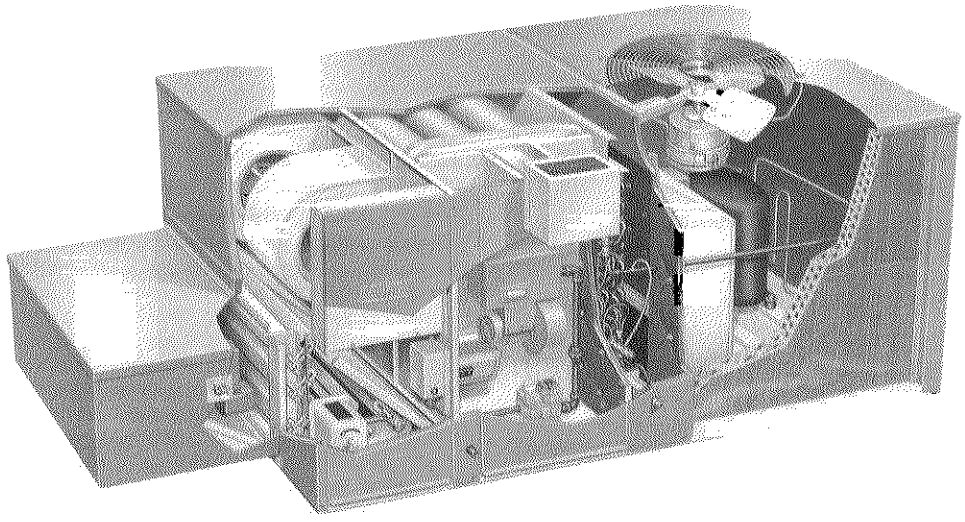
Canadian Edition
ENGINEERING DATA
COMBINATION UNITS
ROOFTOP
Page 7
April 1988
Supersedes December 1986

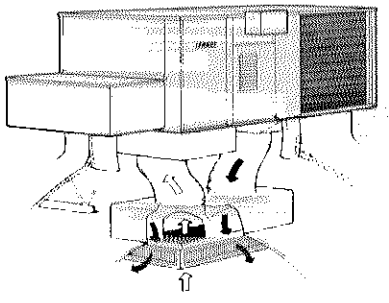
LENNOX®

GCS9 SERIES SINGLE PACKAGE UNITS
ALL SEASON — DX COOLING & GAS HEATING
*34,000 to 55,000 Btuh (10.0 to 16.2 kW) Cooling Capacity
120,000 to 150,000 Btuh (35.2 to 44.0kW) Input Heating Capacity

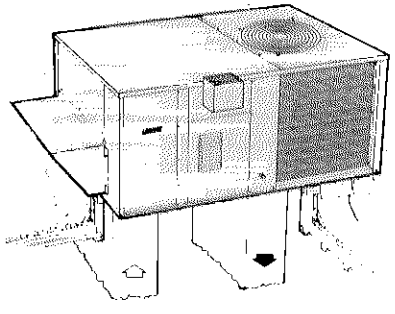
*ARI Standard 210 Certified Ratings



Typical Applications



Rooftop Installation with
Combination Ceiling Supply and Return Air System



Rooftop Installation with
Double Duct Air Distribution System

FEATURES

Application — Lennox GCS9 series all season DX cooling and gas fired (natural gas or LPG) heating units are designed for down-flo or horizontal handling of supply and return air. A separate roof mounting frame mates to the unit base and when flashed into the roof permits weatherproof duct connections and entry into the conditioned area. The units can also be installed with horizontal mounting frame providing horizontal duct connections. A choice of RTD9 step down or FD9 flush ceiling diffusers are available for combination ceiling supply and return air distribution systems. Optional economizer dampers provide "free cooling" by using outdoor air in lieu of mechanical refrigeration. Optional minimum fresh air dampers are also available. Thermostat is not furnished and must be ordered extra. Units are shipped factory assembled, piped and wired. Each unit is factory test operated insuring unit dependability.

Approvals — The design of the units is C.G.A. certified as combination heating-cooling units for outdoor installation. Cooling system has been rated in the Lennox Research Laboratory environmental test room in accordance with ARI Standard 210-81. Additionally, units have been sound rated in the Lennox sound test room in accordance with ARI Standard 270-84. Units and components within are bonded for grounding to meet safety standards for servicing required by U.L. and CEC. Blower data is from tests conducted in the Lennox Laboratory air test chamber.

Equipment Warranty — DURATUBE heat exchangers have a limited warranty for a full ten years. Compressors have a limited warranty for a full five years. All other components have a limited warranty for one year. Refer to the Lennox Equipment Limited Warranty certificate included with the unit for details.

Durable Cabinet — Constructed of heavy gauge galvanized steel and subject to a five station metal wash process. This preparation process results in a perfect bonding surface for the finish paint coat of baked on outdoor enamel. Long lasting enamel finish provides maximum protection from all types of weather. Base section and all cabinet panels where conditioned air is handled are lined with thick fiberglass insulation. Large removable panels allow complete service access. Electrical inlets are furnished in the cabinet for wiring entry. Control box with all controls factory installed and wired is conveniently located in the return air section. Flue vent outlet is fabricated of aluminum for long service life. Removable lifting lugs are furnished for safe and easy rigging. Deep, corrosion resistant drain pan is equipped with a galvanized pipe (mpt) drain outlet.

Rugged DURATUBE Aluminized Steel Heat Exchanger — Cylindrical tube and drum heat exchanger construction permits normal expansion and contraction without metal fatigue. Design also results in high input to heat surface ratio, low resistance to air travel reducing blower output requirements and ease of cleaning. All heat exchanger surfaces, inside and out, are of aluminized steel for superior resistance to corrosion and oxidation. Removable rear breeching provides complete service access. Return air flows through the heat exchanger before the evaporator coil minimizing condensation on heat exchanger during the cooling cycle.

(continued)

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

FEATURES

Gas Power Burner – Provides efficient, trouble free operation and is unaffected by adverse wind or atmospheric conditions. Aluminized steel venturi mixes air and gas in correct proportion for proper combustion. Stainless steel flame spreader fits flame to combustion chamber resulting in uniform heat distribution. Electric direct spark ignition system provides sure, safe main burner ignition. Spark is intermittent and occurs only when required. 24 volt redundant combination control valve combines a manual main shut-off valve, pressure regulation and automatic electric valve (dual) into one compact control. Electronic flame sensor controls assure safe and reliable operation. Combustion air blower is equipped with air pressure switch which proves blower operation, prepurging heat exchanger, before allowing main gas valve to open. Motor is resiliently mounted. In addition, burner has inspection glass for flame viewing, easy combustion air adjustment and is easily removed for service.

Fan and Limit Controls – Factory installed and accurately located. Fan time delay allows blower operation approximately three minutes after burner shut-off. Dual limit controls have fixed temperature setting and protect heating system from abnormal operating conditions.

Refrigeration System – Complete refrigeration system consists of: compressor, condenser coil, evaporator coil, expansion valve, suction and discharge line service gauge ports, liquid line strainer, low pressure switch (automatic reset), refrigerant lines connected and a full operating charge of refrigerant.

Lennox Evaporator and Condenser Coils – Extra large surface area and circuiting of Lennox designed coils provide maximum cooling efficiency, excellent heat transfer and low air resistance. Lennox fabricated 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.

Dependable and Quiet Compressor – Reliable compressor is hermetically sealed and provides trouble-free operation and long service life. Built-in protection devices assure protection from excessive current and temperature. Suction cooled, overload protected and equipped with internal pressure relief. The entire running gear is spring mounted within the sealed housing. In addition, the compressor is installed in the unit on resilient rubber mounts assuring quiet and vibration free operation.

Compressor Crankcase Heater – Furnished and factory installed. Prevents migration of liquid refrigerant into the compressor and ensures proper compressor lubrication at all times. Heater is thermostatically controlled and temperature actuated to operate only when required.

Efficient Condenser Fan – Direct drive fan draws air through the 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 movement through the coils results in high refrigerant cooling capacity. Permanently lubricated, inherently protected, ball bearing fan motor is totally enclosed for maximum protection from rain, dust and corrosion. A rain shield on the motor provides additional moisture protection. Corrosion resistant polyvinyl chloride (PVC) coated steel wire fan guard is furnished.

Powerful Dual Blowers – Units are equipped with twin direct drive centrifugal blowers precisely matched to the units for maximum efficiency and minimum noise level. Blowers are statically and dynamically balanced as an assembly before being installed in the unit. Multiple speed, two shafted motor is resiliently mounted. A choice of blower speeds is available, see blower performance tables. Change in blower speed is easily accomplished by a simple field change in wiring.

Cleanable Air Filters – One inch (25mm) frame filters are furnished as standard. Media is washable or vacuum cleanable polyurethane. Filters are easily accessible for service and media is coated with oil for increased efficiency.

Optional RMFG9-65 Standard Roof Mounting Frame – Mounting frame mates to the GCS9 unit and provides an automatic weather sealed rooftop installation. Shipped knocked down for ease in handling, it is easily field assembled. Approved by National Roofing Contractors Association. See dimension drawing.

Optional RMFGH9-65 Horizontal Roof Mounting Frame – Horizontal discharge frame mates to the GCS9 unit for horizontal (side by side) supply and return air applications. Shipped knocked down for ease of shipping and handling it is easily field assembled. See dimension drawing.

Optional PSDG9-65 Economizer – Economizer dampers and controls are available field installed. The 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 three position spring return damper motor and controlled by the room thermostat, adjustable mixed air sensor, adjustable compressor monitor, and enthalpy control. The enthalpy control allows 0 to 100% outdoor air to be used for "free cooling" when outdoor temperature and humidity is acceptable. A rain hood is furnished and field installs over the intake dampers, external to the unit. Shipped knocked down, it is easily field assembled. A cleanable polyurethane media frame air filter is furnished with the hood providing extra air filtering and bird screen protection. For field installation the two damper sections simply slide in cavities provided in the GCS9 cabinet. Economizer damper assembly is shipped factory wired and only requires plug-in field connection for operation.

Optional REMD9M-65 Economizer with Pressure Relief Damper – The complete economizer assembly consists of: outdoor air intake hood, combination outdoor air and recirculated air damper with pressure operated exhaust air damper. Formed damper blades rotate smoothly in nylon bearings and are gasketed for tight seal. The economizer dampers and controls are shipped factory assembled, adjusted and cycled. The positioning of the outdoor and recirculated air damper is accomplished by a 24 volt fully modulating electronic 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. The enthalpy control allows 0 to 100% outdoor air to be used for "free cooling" when outdoor humidity and temperature are acceptable. The field installed damper assembly slides in the return air section of the unit cabinet. Outdoor air intake hood has a baked-on polyester paint finish and field installs over the dampers, external to the unit. A cleanable aluminum or polyurethane media frame filter in the outdoor air hood provides extra air filtering and bird screen protection.

Optional Differential Enthalpy Control – Used with REMD9M-65 economizer only. 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 return air section and must be ordered extra.

Optional OADG9-65 Automatic Minimum Fresh Air Dampers – Automatically controlled damper assembly allows a fixed amount of outdoor air into the system. Positioning of dampers is accomplished with 24 volt multi-position spring return motor. Only requires plug-in field connection for operation. Damper assembly field installs inside the unit cabinet. Damper blades are gasketed for tight seal and quiet operation. Formed damper blades ride in nylon bearings. A field assembled rain hood is included and installs over the dampers external to the unit. A cleanable polyurethane media frame filter is provided and installs in the hood for extra air filtering and bird screen protection.

Optional OAD3-46/65 Manual Minimum Fresh Air Damper – Fresh air damper field installs external to the return air section of the GCS9 cabinet. Equipped with manually operated damper which will allow a fixed amount of outdoor air into the system.

Optional Timed-Off Control – Timed-off control (LB-50709BA) is available as optional equipment for field installation. Prevents compressor short-cycling and also allows time for suction and discharge pressure to equalize, permitting the compressor to start in an unloaded condition. Automatic reset control will shut the compressor off and hold it off for 5 minutes.

Optional Low Ambient Control Kit – Units will operate satisfactorily down to 50°F (10°C) outdoor air temperature without any additional controls. For cases where operation of the unit is required at lower ambients, a Low Ambient Control Kit (LB-57113BA) can be added in the field, enabling unit to operate properly down to 0° (–18°C)

Optional Heater Kit – M-1913 electric heater is available to automatically control the minimum temperature in the gas burner compartment. Heater is C.G.A. certified to allow cold weather operation of the unit down to –60°F (–50°C)

Optional Thermostat – Thermostat is not furnished with the unit and must be ordered extra. See Lennox Price Book.

Optional SP11 Remote Status Panel — The operation of the unit can be checked on the Remote Status Panel (12F83) 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 cooling operation. Heat Mode light is green and reflects heating operation. Compressor 1 light is green when lit and will turn red if there is an operational malfunction. Compressor 2 light is not required and should be disregarded. The No Heat and Filter lights will show red and indicate a requirement for service. Additional controls are required for use with the Status Panel and must be specified when ordering. Filter Switch Kit (97C85) is used in conjunction with the Filter light. Status Panel Readout Relay Kit (14F92) is required to interface status panel with unit operation. The box field installs in the unit.

Optional RTD9-65 Combination Ceiling Supply and Return Diffuser Assembly — RTD9-65 step-down mount diffuser extends slightly below ceiling level when installed 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 connection collars for round duct connection, hanging rings for suspending and molded fiberglass 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 FD9-65 Combination Ceiling Supply and Return Diffuser Assembly — FD9-65 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 connection collars for round duct connection, support hanger eyelets at the top corners for secure installation and molded fiberglass 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 SRTG9-65 Supply and Return Transitions — Transitions field install in the roof mounting frame and provide segregated and simple duct connections to supply and return diffuser. Completely insulated galvanized steel transitions have collars for round duct connection. Round duct from the transitions to the diffuser is not furnished and must be provided by the installer. Transitions are completely factory assembled and easily field install in the roof mounting frame with minimum costs and labor requirement.

SPECIFICATIONS

Model No.			GCS9-411-120 GCS9-413-120	GCS9-511-150 GCS9-513-150	GCS9-651-150 GCS9-653-150
†Heating Capacity (Nat. & LPG)	Btuh (kW) input		120,000 (35.2)	150,000 (44.0)	150,000 (44.0)
	Btuh (kW) output		90,000 (26.4)	112,500 (33.0)	112,500 (33.0)
Opt. Two Stage †Heating Capacity (Nat. Gas Only)	Btuh (kW) Input (low stage)		----	75,000 (22.0)	75,000 (22.0)
	Btuh (kW) Output (low stage)		----	56,250 (16.5)	56,250 (16.5)
★ARI Standard 270 SRN (bels)			8.0	8.2	8.4
*ARI Standard 210 Ratings	Total cooling capacity Btuh (kW)		34,000 (10.0)	47,000 (13.8)	55,000 (16.2)
	Total unit kW		3.9	5.8	6.9
	EER — Btuh/Watts		8.65	8.10	8.20
Refrigerant charge R-22 — lbs. (kg)			8 (3.6)	10 (4.5)	14 (6.4)
Evaporator Blower	Blower wheel nom. diam. x width in. (mm)		(2) 9 x 7 (229 x 178)	(2) 10 x 6 (254 x 152)	(2) 10 x 6 (254 x 152)
	Motor Horsepower (W)		1/2 (373)	3/4 (560)	3/4 (560)
Evaporator Coil	Net face area — sq. ft. (m^2)		4.69 (.44)	5.73 (.53)	6.51 (.60)
	Tube diameter — in. (mm) & No. of rows		1/2 (12.7) — 3	1/2 (12.7) — 3	1/2 (12.7) — 3
	Fins per inch (m)		13 (512)	13 (512)	13 (512)
Condenser Coil	Net face area — sq. ft. (m^2)		15.0 (1.39)	15.0 (1.39)	15.0 (1.39)
	Tube diameter — in. (mm) & No. of rows		3/8 (9.5) — 1	3/8 (9.5) — 2	3/8 (9.5) — 3
	Fins per inch (m)		20 (787)	20 (787)	20 (787)
Condenser Fan	Diameter in. (mm) & No. of blades		24 (610) 4	24 (610) 4	24 (610) 4
	Air Volume cfm (L/s)		4000 (1888)	4000 (1888)	4000 (1888)
	Motor Horsepower (W)		1/4 (187)	1/4 (187)	1/4 (187)
	Motor kW input		.35	.38	.38
Number & size of filters — in. (mm)			(2) 20 x 20 x 1 (508 x 508 x 25)	(2) 20 x 20 x 1 (508 x 508 x 25)	(2) 20 x 20 x 1 (508 x 508 x 25)
Gas piping connection mpt — in. (mm) Natural & L.P.G.			1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
Recommended gas supply pressure — in. w.c. (kPa)		Natural	6 (1.5)	6 (1.5)	6 (1.5)
		L.P.G.	11 (2.7)	11 (2.7)	11 (2.7)
Condensate drain size mpt — in. (mm)			3/4 (19)	3/4 (19)	3/4 (19)
Net weight of basic unit — lbs. (kg) — 1 Package			735 (333)	785 (356)	835 (379)
Optional Heater Kit (Net Weight)			M-1913 (4 lbs.) (2 kg)		
Optional Roof Mounting Frame (Net weight)		Standard	RMFG9-65 (144 lbs.) (65 kg)		
		Horizontal	RMFGH9-65 (220 lbs.) (100 kg)		
Optional Economizer Dampers (3 position damper motor) (Net weight) Number & size of filters in. (mm)			PSDG9-65 (43 lbs.) (20 kg) **(1) 26 x 31 x 1 (660 x 787 x 25)		
Optional Economizer Dampers with Pressure Relief (Modulating damper motor) — (Net weight) Number & size of filters — in. (mm)			REMD9M-65 (52 lbs.) (24 kg) (1) 20 x 31 x 1 (508 x 787 x 25)		
Optional Minimum Fresh Air Dampers (Automatic) — Net weight) Number & size of filters in. (mm)			OADG9-65 (53 lbs.) (24 kg) **(1) 26 x 31 x 1 (660 x 787 x 25)		
Optional Minimum Fresh Air Damper (Manual) — (Net weight)			OAD3-46/65 (7 lbs.) (3 kg)		
Optional Combination Ceiling Supply and Return Diffusers (Net weight)		Step-down	RTD9-65 (67 lbs. (30 kg)		
		Flush	FD9-65 (33 lbs.) (15 kg)		
		Transitions	SRTG9-65 (25 lbs.) (11 kg)		

★ Rated in accordance with ARI Standard 270.

* Rated in accordance with ARI Standard 210; 95°F (35°C) outdoor air temperature and 80°F (27°C) db/67°F (19.4°C) wb entering evaporator air.

** Frame filter with cleanable polyurethane media.

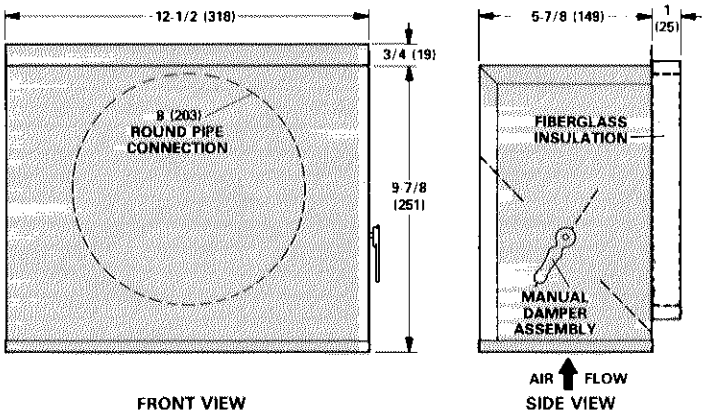
† NOTE — For high altitude installations 2,000 to 4,500 feet (610 to 1370 meters) above sea level, GCS9-510-150 and GCS9-650-150 units must be derated 10%. Derate not required on GCS9 410 120 model.

ELECTRICAL DATA

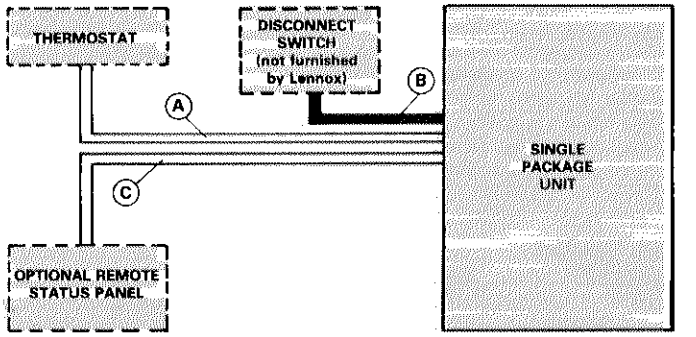
Model No.		GCS9-411	GCS9-413	GCS9-511	GCS9-513		GCS9-651	GCS9-653	
Line Voltage data		†208/230V 60hz/1ph	208/230V 60hz/3ph	†208/230V 60hz/1ph	208/230V 60hz/3ph	550-600V 60hz/3ph	†208/230V 60hz/1ph	208/230V 60hz/3ph	550-600V 60hz/3ph
Compressor	Rated load amps	17.3	12.0	26.5	16.8	5.3	30.7	17.9	6.0
	Locked rotor amps	75.8	65.0	114	84.0	30.4	125.0	90.0	31.0
Condenser Fan Motor	Full load amps	1.9	1.9	1.9	1.9	**	1.9	1.9	**
	Locked rotor amps	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
350 VA Control Transformer (FLA)		1.5	1.5	1.5	1.5	***	1.5	1.5	***
2 KVA Transformer (FLA)		----	----	----	----	3.5	----	----	3.5
Evaporator Blower Motor (230 volt)	Full load amps	4.0	4.0	6.0	6.0	**	6.0	6.0	**
	Locked rotor amps	7.8	7.8	12.8	12.8	12.8	12.8	12.8	12.8
•Recommended maximum fuse size (amps)		40.0	30.0	60.0	40.0	15.0	70.0	45.0	15.0
Unit Power Factor		.94	.87	.95	.91	.91	.96	.88	.88
*Minimum Circuit Ampacity		27.5	20.9	41.0	28.9	10.1	46.3	30.3	11.0

*Refer to Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
**Included in 2 KVA transformer full load amps.
***Not required on 550/600V units.
†Plus 10% and minus 5% of line voltage.
NOTE — Extremes of operating range are plus and minus 10% of line voltage.
•Where current does not exceed 60 amps, circuit breaker may be used in place of fuse.

OPTIONAL OAD3-46/65 MINIMUM FRESH AIR DAMPER



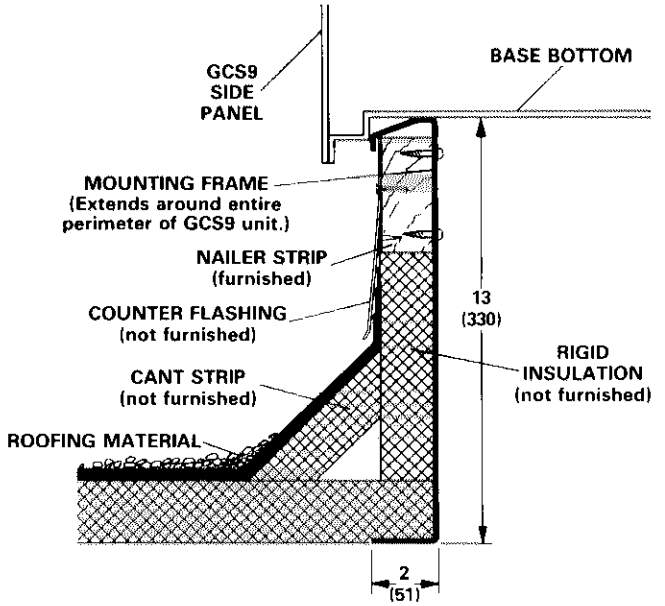
FIELD WIRING



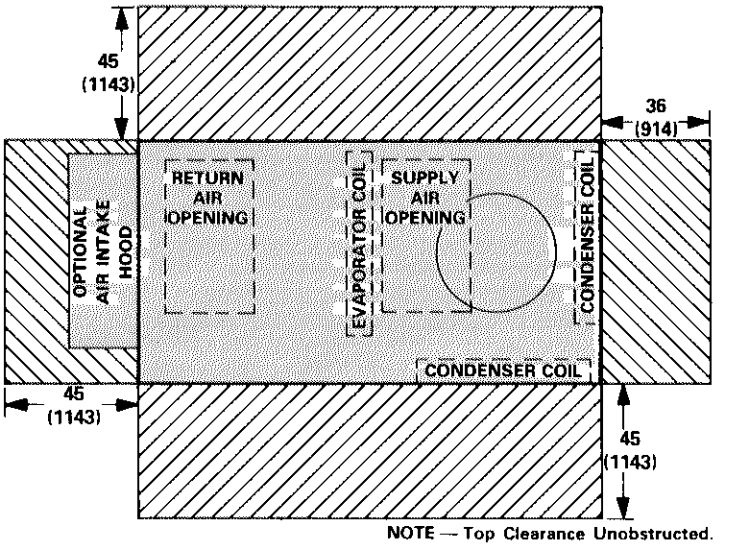
A — *Four Wire Low Voltage (not furnished)
*If Economizer and two stage cooling thermostat are used, one additional wire is required.
B — Two or Three Wire Power (not furnished) — See Electrical Data
C — Seven Wire Low Voltage (not furnished)

NOTE — All wiring must conform to CEC and local electrical codes.

TYPICAL FLASHING FOR RMFG9 ROOF MOUNTING FRAME



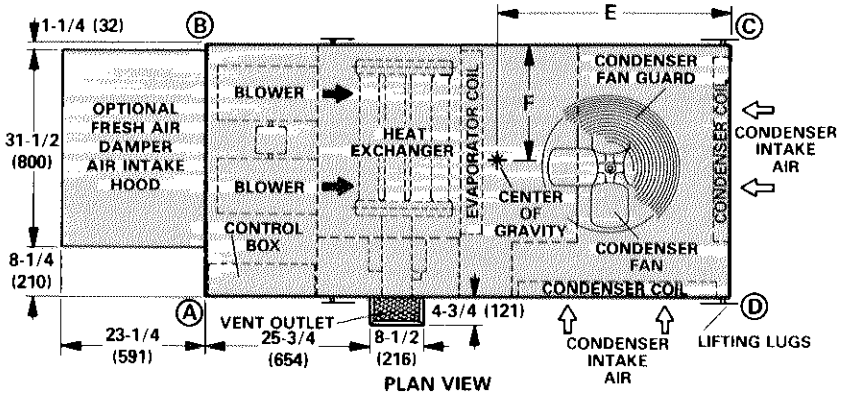
INSTALLATION CLEARANCES — inches (mm)



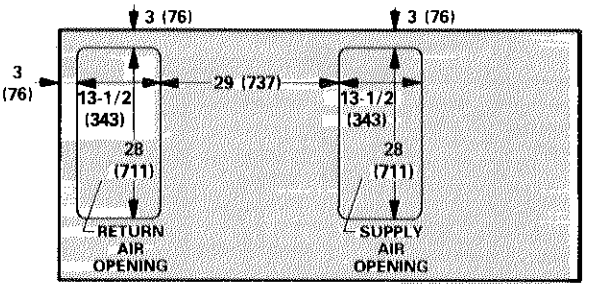
NOTE — Top Clearance Unobstructed.

DIMENSIONS — mm (inches)

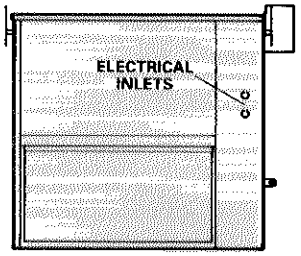
GCS9 UNIT WITH PSDG9-65 ECONOMIZER



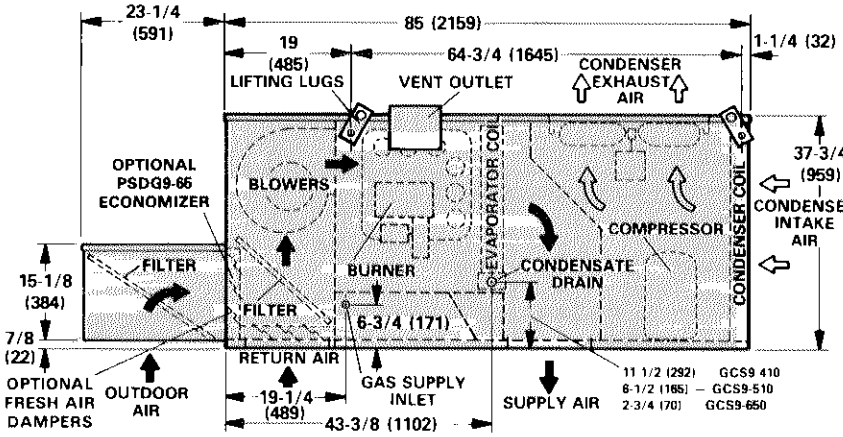
PLAN VIEW



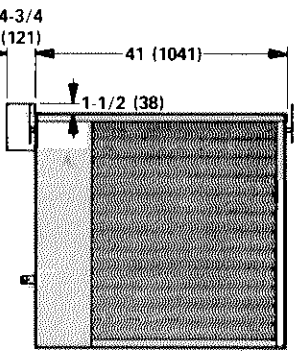
TOP VIEW-BASE SECTION



RETURN AIR END VIEW



FRONT VIEW



CONDENSER END VIEW

CORNER WEIGHTS

Model No.	A		B		C		D	
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg
GCS9-411-413	205	93	210	95	184	83	180	82
GCS9-511-513	211	96	208	94	203	92	206	93
GCS9-651-653	217	98	207	94	222	101	232	105

NOTE – Corner Weights are for GCS9 unit with PSDG9-65

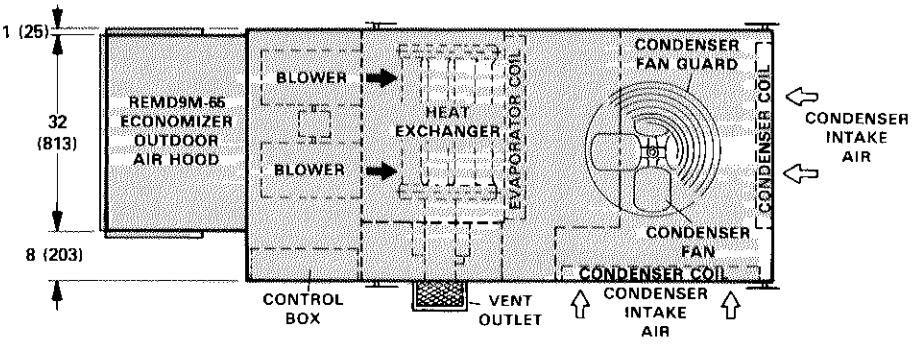
CENTER OF GRAVITY

Model No.	E		F	
	in.	mm	in.	mm
GCS9-411-413	45-3/8	1153	20-1/4	514
GCS9-511-513	43	1092	20-5/8	524
GCS9-651-653	41	1041	21	533

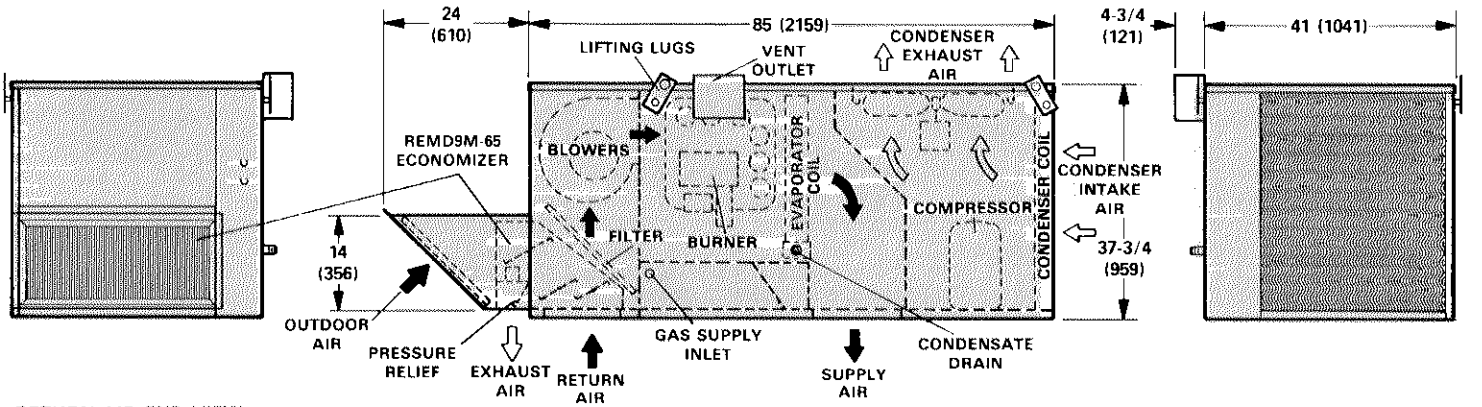
NOTE — Dimensions are for GCS9 unit with PSDG9-65

GCS9 UNIT WITH REMD9M-65 ECONOMIZER WITH PRESSURE RELIEF

For complete unit dimensions, weights and other details, see above.



PLAN VIEW



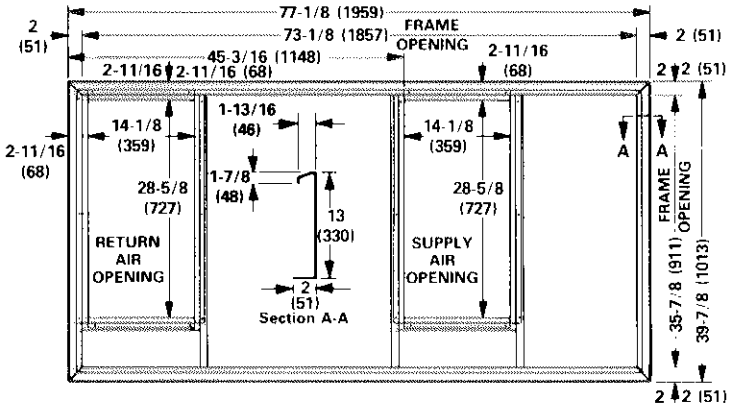
RETURN AIR END VIEW

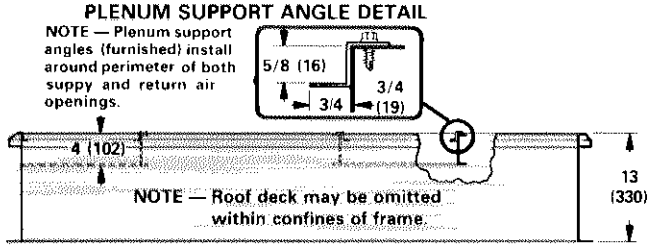
FRONT VIEW

CONDENSER END VIEW

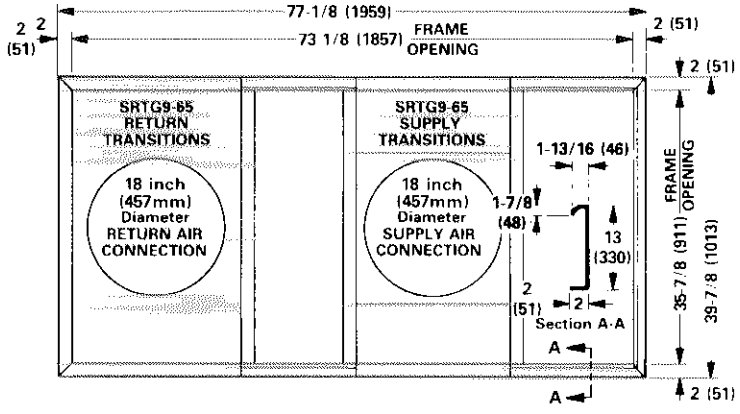
ROOF MOUNTING FRAMES — inches (mm)

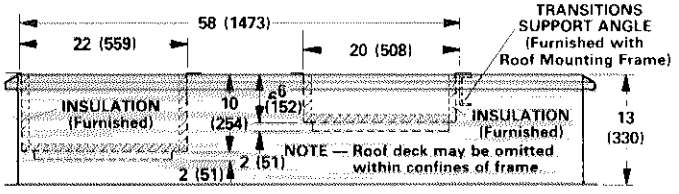
RMFG9-65 STANDARD ROOF MOUNTING FRAME WITH DOUBLE DUCT OPENINGS



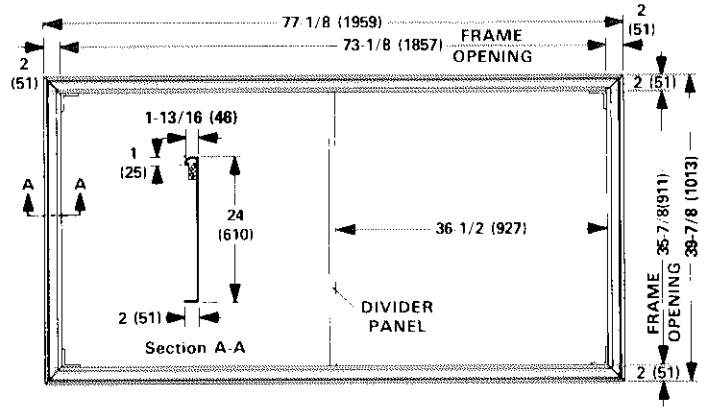


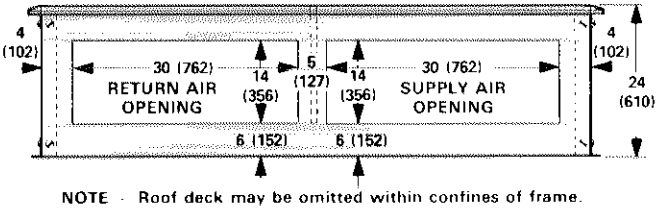
RMFG9-65 STANDARD ROOF MOUNTING FRAME WITH COMBINATION SUPPLY AND RETURN TRANSITIONS FOR RTD9-65 & FD9-65 DIFFUSERS





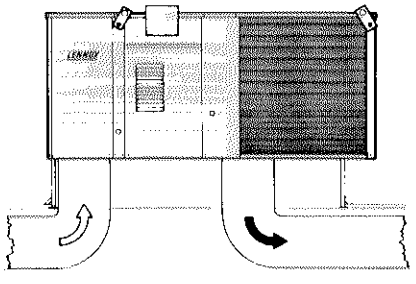
RMFGH9-65 HORIZONTAL ROOF MOUNTING FRAME



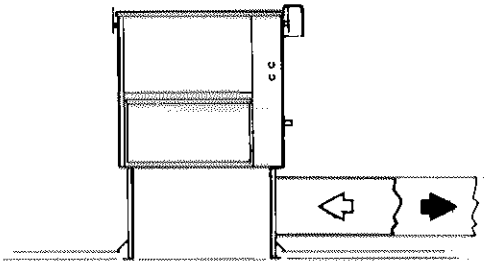


NOTE - Roof deck may be omitted within confines of frame.

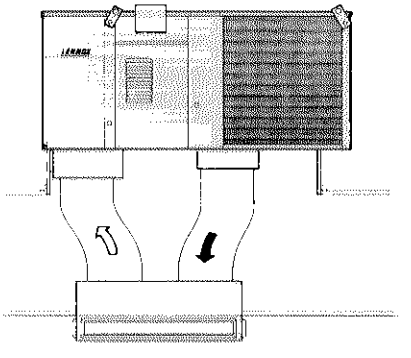
AIR PATTERN



Separate Supply and Return Air (Double) Duct Application

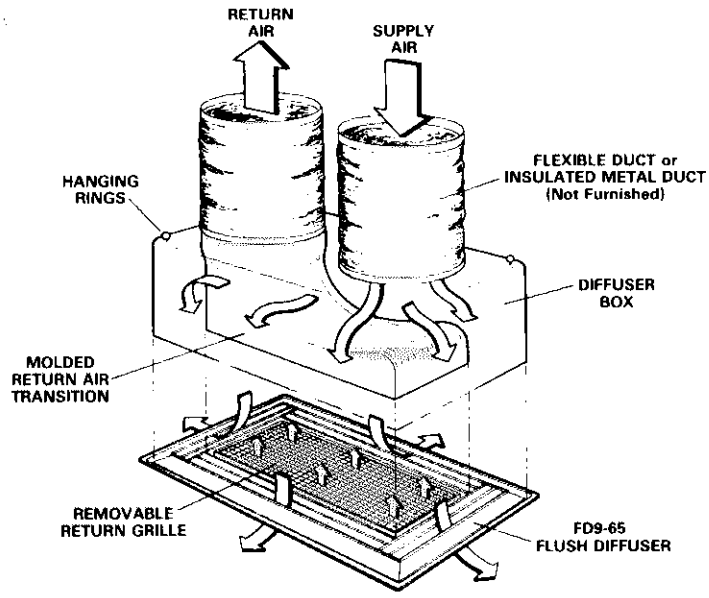


Horizontal Supply and Return Air Duct Application



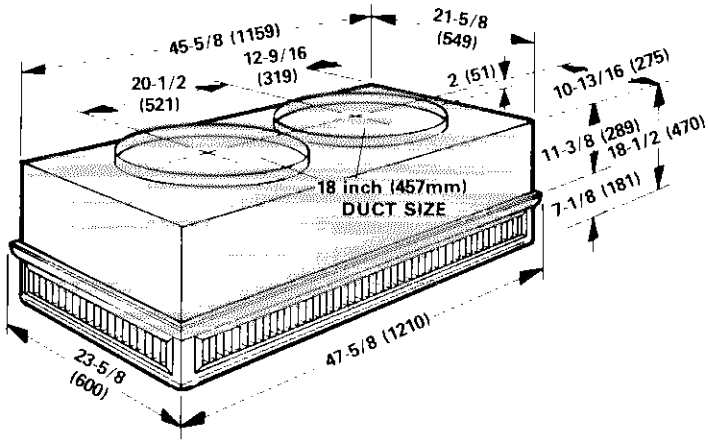
Combination Supply and Return Air Ceiling Diffuser Step-Down or Flush Grille

DIFFUSER AIR PATTERN

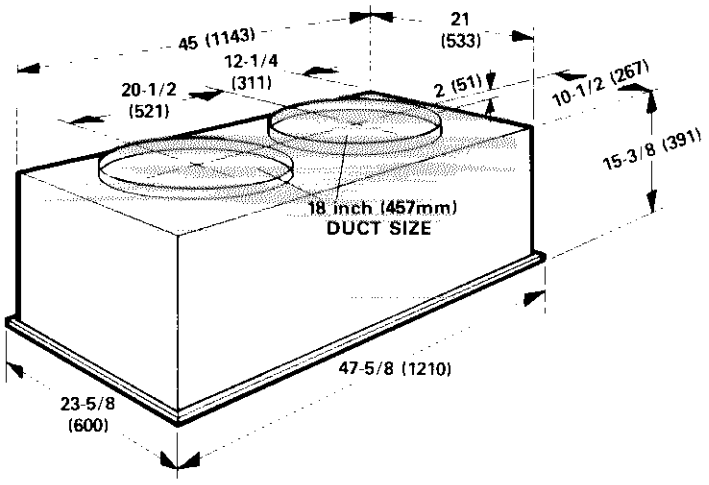


DIMENSIONS — inches (mm)

RTD9-65 STEP-DOWN CEILING DIFFUSER



FD9-65 FLUSH CEILING DIFFUSER



RTD9-65 STEP-DOWN CEILING DIFFUSER AIR THROW DATA

Grille Vanes	Air Volume		*Effective Throw — ft. (m)		
			Horizontal Vanes	Horizontal Vanes	Horizontal Vanes
	cfm	L/s	180° Straight	22° Down	45° Down
2 Ends Open	600	285	21 (6.5)	20 (6.0)	14 (4.5)
	800	380	22 (6.5)	21 (6.5)	15 (4.5)
	1000	470	24 (7.5)	22 (6.5)	16 (5.0)
	1200	565	25 (7.5)	23 (7.0)	17 (5.0)
	1400	660	27 (8.0)	25 (7.5)	18 (5.5)
	1600	755	29 (9.0)	26 (8.0)	19 (6.0)
	1800	850	31 (9.5)	27 (8.0)	20 (6.0)
	2000	945	33 (10.0)	28 (8.5)	21 (6.5)
	2200	1040	35 (10.5)	30 (9.0)	22 (6.5)
	2400	1135	38 (11.5)	34 (10.5)	23 (7.0)
1 Side 2 Ends Open	600	285	15 (4.5)	14 (4.5)	8 (2.5)
	800	380	16 (5.0)	15 (4.5)	9 (2.5)
	1000	470	17 (5.0)	16 (5.0)	10 (3.0)
	1200	565	18 (5.5)	17 (5.0)	11 (3.5)
	1400	660	19 (6.0)	18 (5.5)	12 (3.5)
	1600	755	20 (6.0)	18 (5.5)	12 (3.5)
	1800	850	21 (6.5)	19 (6.0)	13 (4.0)
	2000	945	23 (7.0)	20 (6.0)	14 (4.5)
	2200	1040	25 (7.5)	22 (6.5)	16 (5.0)
	2400	1135	27 (8.0)	24 (7.5)	17 (5.0)
All Ends And Sides Open	600	285	11 (3.5)	10 (3.0)	7 (2.0)
	800	380	12 (3.5)	11 (3.5)	8 (2.5)
	1000	470	13 (4.0)	12 (3.5)	8 (2.5)
	1200	565	14 (4.5)	13 (4.0)	9 (2.5)
	1400	660	15 (4.5)	14 (4.5)	9 (2.5)
	1600	755	16 (5.0)	14 (4.5)	10 (3.0)
	1800	850	17 (5.0)	15 (4.5)	10 (3.0)
	2000	945	18 (5.5)	16 (5.0)	11 (3.5)
	2200	1040	19 (6.0)	17 (5.0)	12 (3.5)
	2400	1135	20 (6.0)	18 (5.5)	12 (3.5)

*Effective throw is terminated at a point where conditioned air velocity has decreased to 50 ft. (15m) per minute.

FD9-65 FLUSH CEILING DIFFUSER AIR THROW DATA

Air Volume		*Effective Throw — ft. (m)
cfm	L/s	
600	285	7 (2.0)
800	380	8 (2.5)
1000	470	8 (2.5)
1200	565	9 (2.5)
1400	660	9 (2.5)
1600	755	10 (3.0)
1800	850	11 (3.5)
2000	945	12 (3.5)
2200	1040	12 (3.5)
2400	1135	13 (4.0)

*Effective throw is terminated at a point where conditioned air velocity has decreased to 50 ft. (15m) per minute.

BLOWER DATA

GCS9-411-413 BLOWER PERFORMANCE

External Static Pressure		Air Volume @ Various Speeds					
		High		Medium		Low	
Pa	in. wg.	L/s	cfm	L/s	cfm	L/s	cfm
0	0	925	1960	815	1725	760	1610
12	.05	900	1910	800	1700	750	1585
25	.10	880	1865	785	1660	730	1550
37	.15	855	1815	765	1620	715	1515
50	.20	830	1760	745	1575	695	1475
62	.25	805	1710	725	1535	680	1440
75	.30	785	1660	700	1485	660	1395
100	.40	730	1545	655	1390	615	1300
125	.50	675	1425	605	1285	565	1200

NOTE — All air volume data is measured external to unit with filter in place.

GCS9-411-413 BLOWER PERFORMANCE WITH PSDG9-65 OR REMD9M-65 AND DUCT DISTRIBUTION

External Static Pressure		Air Volume @ Various Speeds					
		High		Medium		Low	
Pa	in. wg.	L/s	cfm	L/s	cfm	L/s	cfm
0	0	880	1860	775	1640	720	1530
12	.05	855	1815	760	1615	710	1505
25	.10	835	1770	745	1575	695	1470
37	.15	815	1725	725	1540	680	1440
50	.20	790	1670	705	1495	660	1400
62	.25	765	1625	690	1460	645	1370
75	.30	745	1575	665	1410	625	1325
100	.40	695	1470	625	1320	585	1235
125	.50	640	1355	575	1220	540	1140

NOTE — All air volume data is measured external to unit with filter in place.

GCS9-511-513 BLOWER PERFORMANCE

External Static Pressure		Air Volume @ Various Speeds					
		High		Medium		Low	
Pa	in. wg.	L/s	cfm	L/s	cfm	L/s	cfm
0	0	1105	2345	880	1865	735	1560
12	.05	1090	2305	875	1850	735	1555
25	.10	1070	2270	865	1830	730	1550
37	.15	1050	2230	855	1810	730	1545
50	.20	1030	2185	845	1790	725	1535
62	.25	1010	2145	830	1760	715	1515
75	.30	990	2095	815	1730	705	1490
100	.40	950	2010	785	1665	660	1400
125	.50	905	1915	750	1585	610	1295

NOTE — All air volume data is measured external to unit with filter in place.

GCS9-511-513 BLOWER PERFORMANCE WITH PSDG9-65 OR REMD9M-65 AND DUCT DISTRIBUTION

External Static Pressure		Air Volume @ Various Speeds					
		High		Medium		Low	
Pa	in. wg.	L/s	cfm	L/s	cfm	L/s	cfm
0	0	1060	2250	835	1770	700	1480
12	.05	1045	2210	825	1750	695	1475
25	.10	1025	2175	820	1740	695	1470
37	.15	1010	2145	810	1720	690	1465
50	.20	990	2095	800	1700	690	1460
62	.25	970	2060	790	1675	680	1440
75	.30	950	2010	775	1645	665	1410
100	.40	915	1935	745	1575	630	1335
125	.50	870	1835	710	1500	580	1225

NOTE — All air volume data is measured external to unit with filter in place.

GCS9-651-653 BLOWER PERFORMANCE

External Static Pressure		Air Volume @ Various Speeds					
		High		Medium		Low	
Pa	in. wg.	L/s	cfm	L/s	cfm	L/s	cfm
0	0	1155	2450	910	1930	750	1590
12	.05	1140	2410	900	1910	750	1585
25	.10	1120	2370	890	1890	745	1580
37	.15	1100	2330	880	1870	745	1575
50	.20	1075	2280	870	1850	740	1565
62	.25	1055	2240	860	1820	730	1545
75	.30	1035	2190	845	1790	715	1520
100	.40	990	2100	810	1720	675	1430
125	.50	945	2000	775	1640	625	1320

NOTE — All air volume data is measured external to unit with filter in place.

GCS9-651-653 BLOWER PERFORMANCE WITH PSDG9-65 OR REMD9M-65 AND DUCT DISTRIBUTION

External Static Pressure		Air Volume @ Various Speeds					
		High		Medium		Low	
Pa	in. wg.	L/s	cfm	L/s	cfm	L/s	cfm
0	0	1110	2350	865	1830	715	1510
12	.05	1090	2310	855	1810	710	1505
25	.10	1070	2270	850	1800	710	1500
37	.15	1055	2240	840	1780	705	1495
50	.20	1035	2190	830	1760	700	1490
62	.25	1015	2150	815	1730	695	1470
75	.30	990	2100	800	1700	680	1440
100	.40	955	2020	770	1630	640	1360
125	.50	905	1920	730	1550	590	1250

NOTE — All air volume data is measured external to unit with filter in place.

GCS9-411-413 BLOWER PERFORMANCE WITH PSDG9-65 OR REMD9M-65 AND CEILING DIFFUSERS

Blower Speed Setting	Air Volume @ Various Speeds With Various Discharge Grille Arrangements							
	FD9-65 Flush Model		RTD9-65 Step-Down Model					
			2 Sides Open		3 Sides Open		4 Sides Open	
	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm
High	765	1620	705	1490	740	1570	765	1620
Medium	700	1480	655	1390	685	1450	700	1480
Low	660	1400	630	1330	650	1380	660	1400

GCS9-511-513 BLOWER PERFORMANCE WITH PSDG9-65 OR REMD9M-65 AND CEILING DIFFUSERS

Blower Speed Setting	Air Volume @ Various Speeds With Various Discharge Grille Arrangements							
	FD9-65 Flush Model		RTD9-65 Step-Down Model					
			2 Sides Open		3 Sides Open		4 Sides Open	
	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm
High	930	1970	845	1790	890	1890	930	1970
Medium	785	1660	735	1560	765	1620	785	1660
Low	685	1450	655	1390	675	1430	685	1450

GCS9-651-653 BLOWER PERFORMANCE WITH PSDG9-65 OR REMD9M-65 AND CEILING DIFFUSERS

Blower Speed Setting	Air Volume @ Various Speeds With Various Discharge Grille Arrangements							
	FD9-65 Flush Model		RTD9-65 Step-Down Model					
			2 Sides Open		3 Sides Open		4 Sides Open	
	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm
High	960	2040	870	1840	920	1950	960	2040
Medium	805	1710	755	1600	785	1660	805	1710
Low	700	1480	665	1410	690	1460	700	1480

COOLING RATINGS

NOTE — To determine sensible capacity, leaving wet bulb and dry bulb temperatures not shown in the tables, see Miscellaneous Engineering Data section, page 11.

GCS9-411-413 COOLING CAPACITY

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Condenser Coil																
			85°F (29°C)						95°F (35°C)						105°F (41°C)				
			Total Cooling Capacity		Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb		
	L/s	cfm	kW	Btuh		76°F 24°C	80°F 27°C	84°F 29°C	kW	Btuh		76°F 24°C	80°F 27°C	84°F 29°C	kW	Btuh		76°F 24°C	80°F 27°C	84°F 29°C
63°F (17.2°C)	565	1200	10.2	34,900	2910	.82	.95	1.00	9.7	33,000	3110	.84	.98	1.00	9.1	31,000	3310	.87	1.00	1.00
	635	1350	10.4	35,600	2930	.85	.99	1.00	9.8	33,600	3130	.88	1.00	1.00	9.3	31,800	3350	.91	1.00	1.00
	710	1500	10.6	36,200	2950	.89	1.00	1.00	10.0	34,300	3160	.92	1.00	1.00	9.5	32,500	3380	.95	1.00	1.00
67°F (19.4°C)	565	1200	10.9	37,100	2970	.63	.76	.88	10.2	34,900	3180	.65	.78	.92	9.6	32,700	3390	.67	.81	.95
	635	1350	11.0	37,600	2980	.66	.79	.93	10.3	35,300	3190	.67	.82	.96	9.7	33,200	3410	.69	.85	.99
	710	1500	11.1	38,000	2990	.68	.82	.97	10.5	35,700	3210	.70	.85	1.00	9.8	33,500	3420	.72	.89	1.00
71°F (21.7°C)	565	1200	11.6	39,600	3040	.47	.59	.71	10.9	37,200	3260	.48	.60	.73	10.3	35,000	3480	.48	.62	.75
	635	1350	11.7	40,100	3050	.48	.61	.74	11.0	37,600	3270	.49	.62	.76	10.3	35,300	3500	.50	.64	.79
	710	1500	11.8	40,400	3060	.49	.63	.77	11.1	38,000	3280	.50	.65	.80	10.4	35,600	3510	.51	.67	.83

GCS9-511-513 COOLING CAPACITY

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Condenser Coil																
			85°F (29°C)						95°F (35°C)						105°F (41°C)				
			Total Cooling Capacity		Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb		
	L/s	cfm	kW	Btuh		76°F 24°C	80°F 27°C	84°F 29°C	kW	Btuh		76°F 24°C	80°F 27°C	84°F 29°C	kW	Btuh		76°F 24°C	80°F 27°C	84°F 29°C
63°F (17.2°C)	755	1600	14.2	48,600	4280	.78	.91	.99	13.5	46,200	4620	.80	.93	.99	12.8	43,800	4950	.83	.96	.99
	850	1800	14.5	49,600	4320	.81	.94	.99	13.8	47,200	4660	.84	.97	.99	13.0	44,500	4990	.86	.99	.99
	945	2000	14.8	50,500	4340	.84	.98	.99	14.0	47,900	4690	.87	.99	.99	13.4	45,600	5040	.89	.99	.99
67°F (19.4°C)	755	1600	15.3	52,200	4410	.61	.73	.84	14.5	49,400	4760	.62	.74	.86	13.7	46,600	5090	.64	.77	.89
	850	1800	15.5	52,900	4430	.63	.75	.88	14.7	50,100	4780	.64	.77	.90	13.9	47,300	5120	.66	.80	.93
	945	2000	15.7	53,600	4460	.65	.78	.91	14.9	50,700	4810	.66	.80	.94	14.0	47,800	5140	.68	.83	.97
71°F (21.7°C)	755	1600	16.4	56,000	4540	.45	.56	.67	15.6	53,100	4900	.46	.57	.69	14.7	50,000	5240	.47	.59	.71
	850	1800	16.6	56,800	4570	.46	.58	.70	15.7	53,700	4930	.47	.59	.72	14.8	50,600	5270	.48	.61	.74
	945	2000	16.8	57,500	4590	.47	.60	.72	15.9	54,300	4950	.48	.61	.75	15.0	51,100	5290	.49	.63	.77

GCS9-651-653 COOLING CAPACITY

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Condenser Coil																
			85°F (29°C)						95°F (35°C)						105°F (41°C)				
			Total Cooling Capacity		Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp. Motor Watts Input	Sensible To Total Ratio (S/T) Dry Bulb		
	L/s	cfm	kW	Btuh		76°F 24°C	80°F 27°C	84°F 29°C	kW	Btuh		76°F 24°C	80°F 27°C	84°F 29°C	kW	Btuh		76°F 24°C	80°F 27°C	84°F 29°C
63°F (17.2°C)	945	2000	17.1	58,400	5045	.79	.92	.95	16.2	55,300	5285	.82	.95	1.00	15.3	52,100	5845	.89	1.00	1.00
	1060	2250	17.4	59,400	5090	.83	.96	1.00	16.5	56,300	5335	.89	.99	1.00	15.6	53,000	5605	.93	1.00	1.00
	1180	2500	17.8	60,800	5125	.89	.99	1.00	16.8	57,400	5375	.93	1.00	1.00	16.0	54,500	5660	.96	1.00	1.00
67°F (19.4°C)	945	2000	18.3	62,400	5200	.61	.74	.86	17.3	59,000	5445	.63	.76	.89	16.3	55,500	5710	.63	.78	.92
	1060	2250	18.5	63,300	5230	.63	.76	.89	17.6	59,900	5470	.65	.79	.92	16.5	56,300	5735	.66	.81	.96
	1180	2500	18.8	64,100	5265	.65	.79	.92	17.8	60,600	5505	.66	.82	.96	16.7	56,900	5770	.68	.85	.98
71°F (21.7°C)	945	2000	19.6	67,000	5360	.44	.57	.69	18.5	63,300	5605	.45	.58	.72	17.4	59,500	5870	.46	.60	.75
	1060	2250	19.9	67,800	5395	.45	.59	.72	18.8	64,100	5635	.46	.60	.74	17.6	60,200	5900	.47	.62	.77
	1180	2500	20.1	68,600	5420	.46	.61	.74	19.0	64,800	5655	.47	.62	.76	17.8	60,900	5920	.48	.64	.79

GUIDE SPECIFICATIONS

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

General — *Furnish and install a single package combination air to air DX mechanical cooling system and gas fired heating 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 manufacturer shall have parts and service available throughout Canada.*

The installed weight shall not be more than ..... lbs. (kg). Entire unit shall have a width of not more than ..... in. (mm), a depth of not more than ..... in. (mm) and an overall height of not more than ..... in. (mm). 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.

Equipment Warranty — *DURATUBE heat exchanger shall have a limited warranty for a full ten years. Compressor shall have a limited warranty for a full five years. All other components shall have a limited warranty for one year. Refer to Lennox Equipment Limited Warranty certificate included with unit for details.*

Roof Mounting Frame — *Furnish and install a steel roof mounting frame for bottom or horizontal discharge and return air duct. 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.*

Air Distribution — *Equipment shall be capable of bottom or side (horizontal) handling of conditioned air. All air distribution ducts shall be fiberglass or ..... ga. (mm) galvanized steel insulated with ..... in. (mm) thick ..... lb./ft.^{3} (kg/m^3) density fiberglass or equivalent.*

Furnish and install a (flush or stepdown) optional combination ceiling supply and return air grille. It shall be capable of not less than ..... ft. (m) radius of effective throw.

Cooling System — *The total certified cooling capacity shall not be less than ..... Btuh (kW) with an evaporator air volume of ..... cfm (L/s), an entering wet bulb air temperature of ..... °F (°C), an entering dry bulb air temperature of ..... °F (°C) and a condenser entering temperature of ..... °F (°C). 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 ..... sq. ft. (m^2) (evaporator) and ..... sq. ft. (m^2) (condenser). The compressor shall be resiliently mounted, have overload protection, internal pressure relief and crankcase heater. The refrigeration system shall have expansion valve, suction and discharge line service gauge ports, liquid line strainer, low pressure switch and full refrigerant charge. Control options shall consist of thermostat, timed-off control and low ambient kit. Shall be rated in accordance with ARI Standard 210-81.

Heating System — *The heating capacity output shall be ..... Btuh (kW) with a gas input of ..... Btuh (kW).*

Cylindrical tube and drum heat exchanger shall be constructed of aluminized steel. Power burner shall have electric spark ignition, 100% safety shutoff electronic flame sensing controls, flame inspection glass window, prepurging and combustion air adjustment.

All controls shall be listed for operation at low outdoor air temperatures. System shall be equipped with dual limit safety controls. Shall be C.G.A. certified for outdoor installation when fired with natural gas or LPG.

Cabinet — *Shall be of galvanized steel with a baked-on outdoor enamel paint finish. Base section and cabinet panels where conditioned air is handled shall be fully insulated to prevent sweating and minimize sound. Lifting lugs shall be provided for easy rigging. Openings shall be provided for power connection entry.*

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

Air Movers — *Twin centrifugal conditioned air blowers shall be direct driven by a single, two shafted, 3-speed motor and be capable of delivering ..... cfm (L/s) at an external static pressure of ..... inches water gauge (Pa) requiring not more than ..... bhp (W) and ..... rpm. Blowers shall be statically and dynamically balanced.*

Propeller type condenser fan shall discharge vertically and be direct driven by a ..... hp (W) 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 — *Cleanable filters furnished shall have not less than ..... sq. ft. (m^2) of free area.*

Economizer — *Furnish and install complete with controls an optional air mixing damper assembly including outdoor air recirculated air dampers. Pressure relief shall be available with REMD9M-65. The assembly shall provide for the introduction of outside air for minimum ventilation and free cooling. A rain hood with air filter shall mount external to the unit cabinet. The damper motor shall be 24 volt, 3 position (PSDG9-65) or fully modulating (REMD9M-65) spring return. Controls for PSDG9-65 shall include adjustable mixed air sensor, adjustable compressor monitor, minimum position potentiometer and enthalpy control. Controls for REMD9M-65 shall include electronic discharge air sensor, minimum position potentiometer and solid-state adjustable outdoor air enthalpy control. Control option for REMD9M-65 shall consist of differential enthalpy control (return air sensor).*

Automatic Minimum Fresh Air Damper — *Optional damper assembly shall be available to automatically control outdoor air requirements. The assembly shall mount within the confines of the unit cabinet. Damper motor shall be 24 volt, multi-position spring return. A rain hood with air filter shall mount external to the unit cabinet.*

Manual Minimum Fresh Air Damper — *Optional fresh air damper shall be available to manually control outdoor air requirements. The damper box shall mount external to the unit cabinet and shall be equipped with manually operated damper.*

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, No Heat and Filter.*