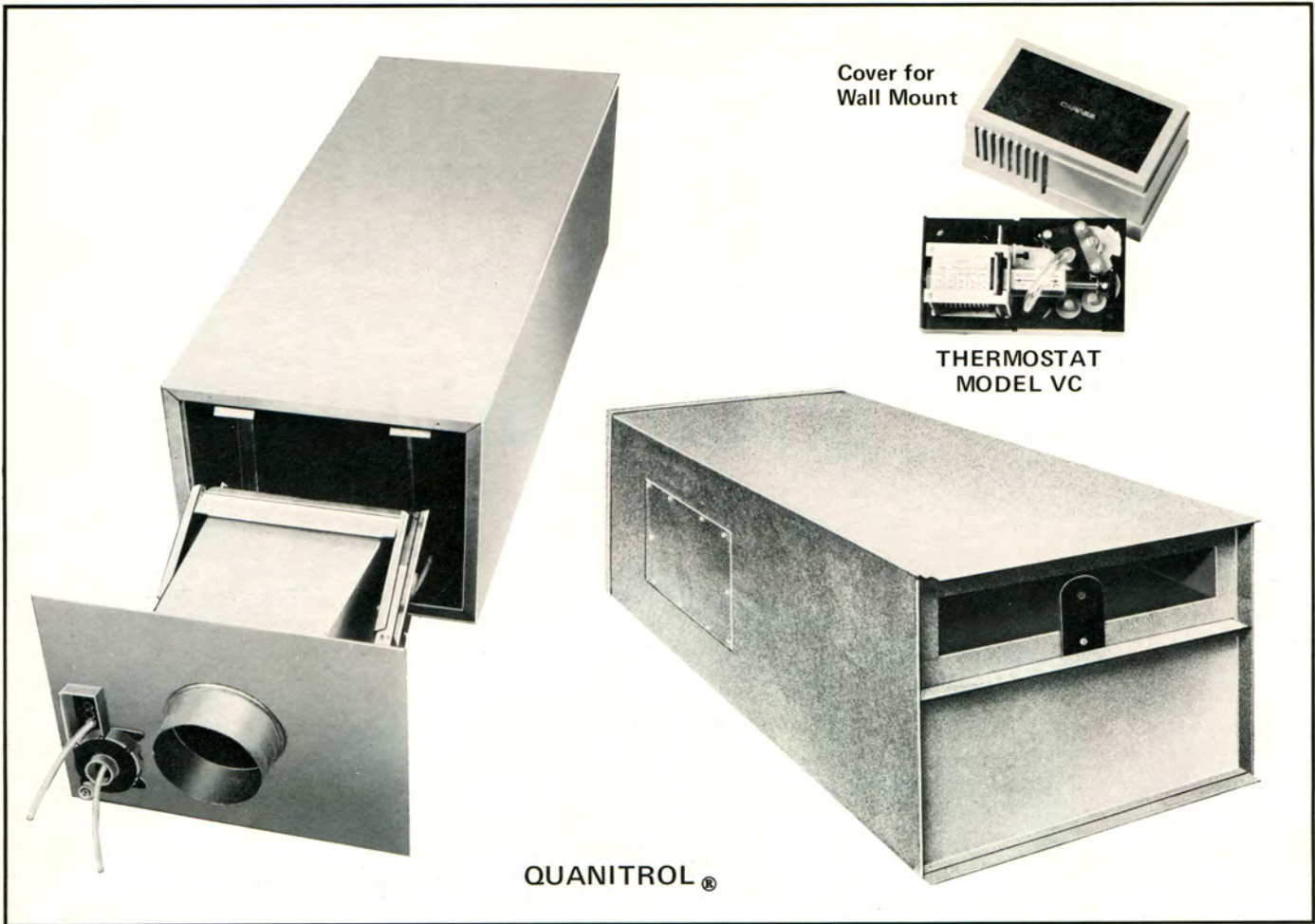


# ACOUSTICAL TERMINAL CONTROL UNITS - HIGH CAPACITY - VARIABLE AIR VOLUME - SYSTEM ENERGY POWERED



## Features

### Energy Savings

The entire unit can be powered and controlled by a unit pressure drop as low as 0.5 inch W.G. This keeps the system pressure and fan horsepower to a minimum.

### Large Capacity

A single QUANITROL unit can supply up to 3200 cfm. This provides maximum economy for large single zones.

### System Balance

The exact volume, from minimum to maximum can be set at the thermostat. A constant volume is maintained for a given thermostat setting regardless of any system pressure variations up to 6" W.G.  $\Delta P$

### Precise Control

The air volume will vary from maximum to zero or minimum set point in response to the thermostat. Thermostat can be wall mounted or located in the return air.

### Reheat Available

A reheat pressure/electric switch can be actuated by the system powered thermostat permitting exterior zones to be handled by either hydronic or electric reheat.

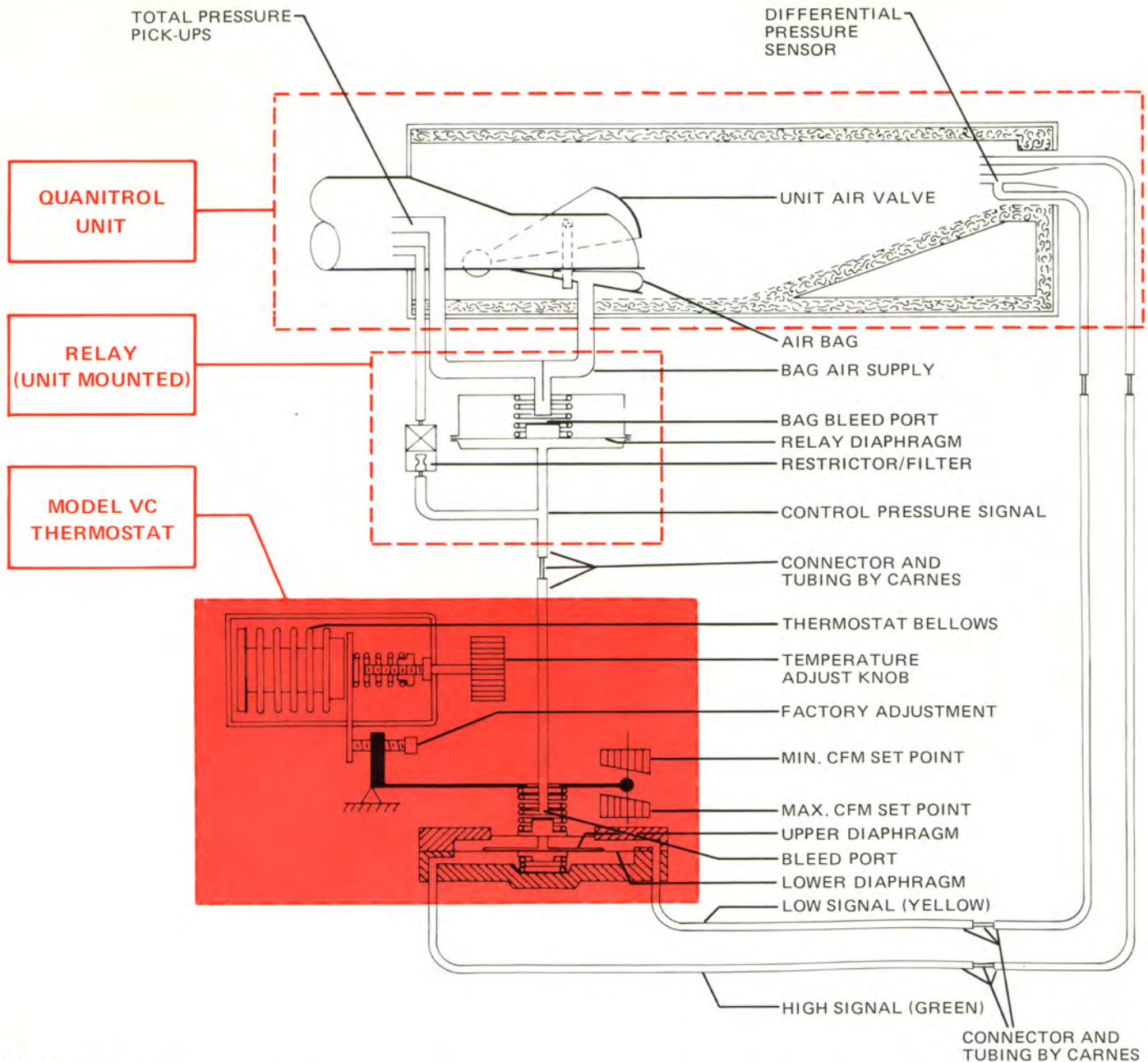
### Single Responsibility

The entire terminal system and all its controls are the product of one manufacturer. This includes the terminal unit, the thermostat, the actuating mechanism, and the air distribution equipment.

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# Principle of Operation



## Operation

The Model VC thermostat is a reset constant volume device. The air flow through the unit valve is reset in response to the room temperature requirements and is unaffected by duct pressure changes.

The thermostats' vapor filled bellows response range is from 65°F to 95°F. Acting through the linkage, the bellows sets the spring compression force acting on the upper thermostat diaphragm. The upper and lower diaphragm are inter-connected so the spring compression force can be balanced by the high and low pressure signals from the differential pressure sensor acting on the lower diaphragm. (Differential pressure is a function of velocity and thus the air quantity handled by the unit.)

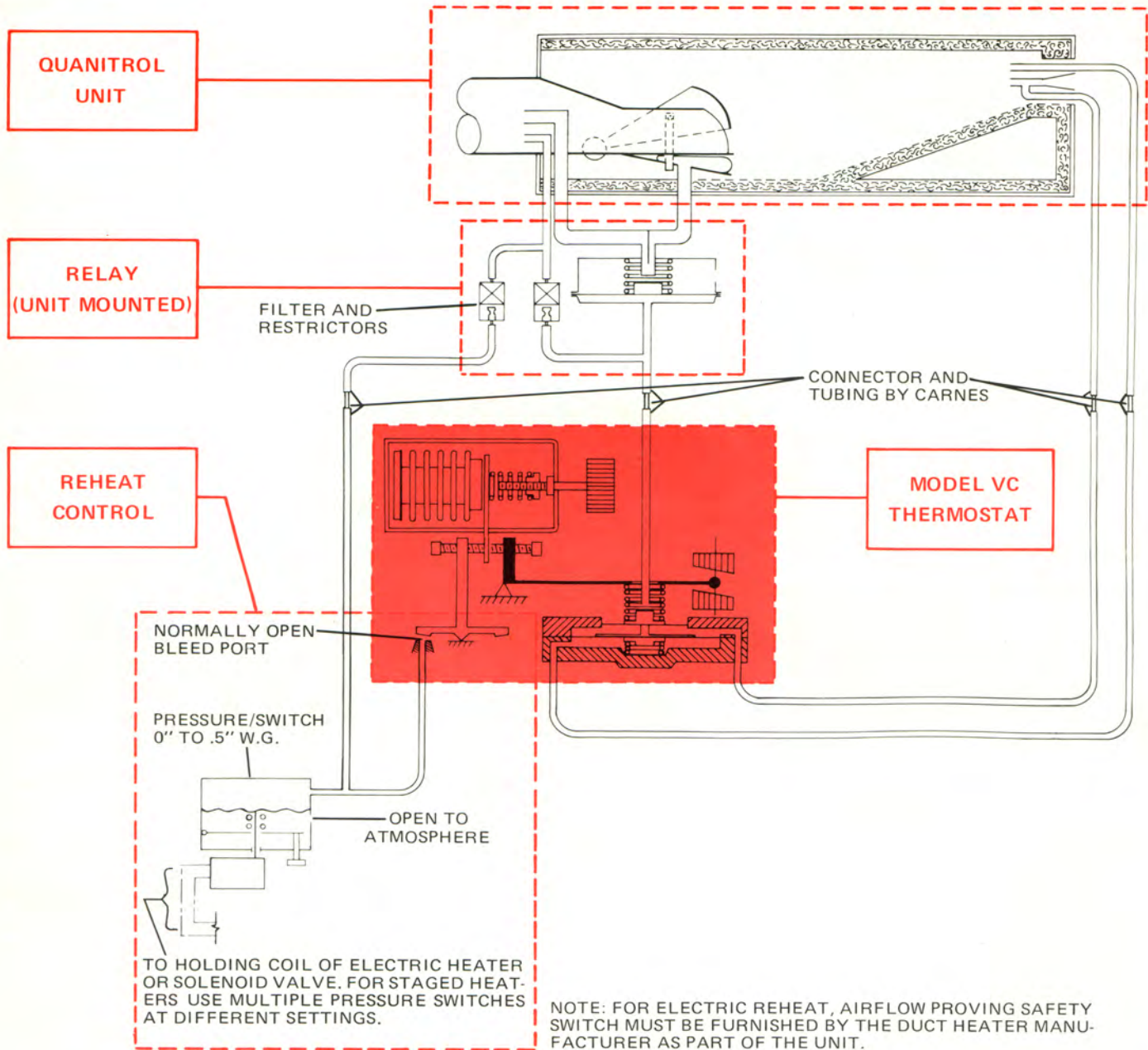
The control air supply is picked up from the total pressure at the inlet of the unit and is fed through the filter/restrictor to the thermostat and relay. The air bag supply is also picked up from total inlet pressure and feeds through a larger line through the relay.

In operation, the upper diaphragm acts on the bleed port, to prevent or allow the control air to bleed depending on the temperature and pressure differential interaction. The relay essentially duplicates the bleed-no bleed action of the thermostat on the bag air supply. In this way, the bag air supply either fills the air bag closing the unit valve, or bleeds to atmosphere emptying the air bag and opening the air valve.

Operation of the air valve is in reverse acting sequence. That is, a drop in room temperature causes increased pressure to the air bag which in turn closes the valve. In normal operation, there is a balanced bleed allowing the air bag and valve to maintain an intermediate position.

The air maximum and minimum handled by the unit can be set at the thermostat by adjusting the maximum and minimum set point cams which in turn limit the spring reset limits.

# Reheat Capability



The normally open bleed port supplied with the Model VC Thermostat is connected to a pressure switch with a range of 0" to .5" water gauge. It is powered by the total pressure pick-up and activated by the thermostat bellows and normally open bleed port combination.

Upon detecting a temperature drop, the bellows contract,

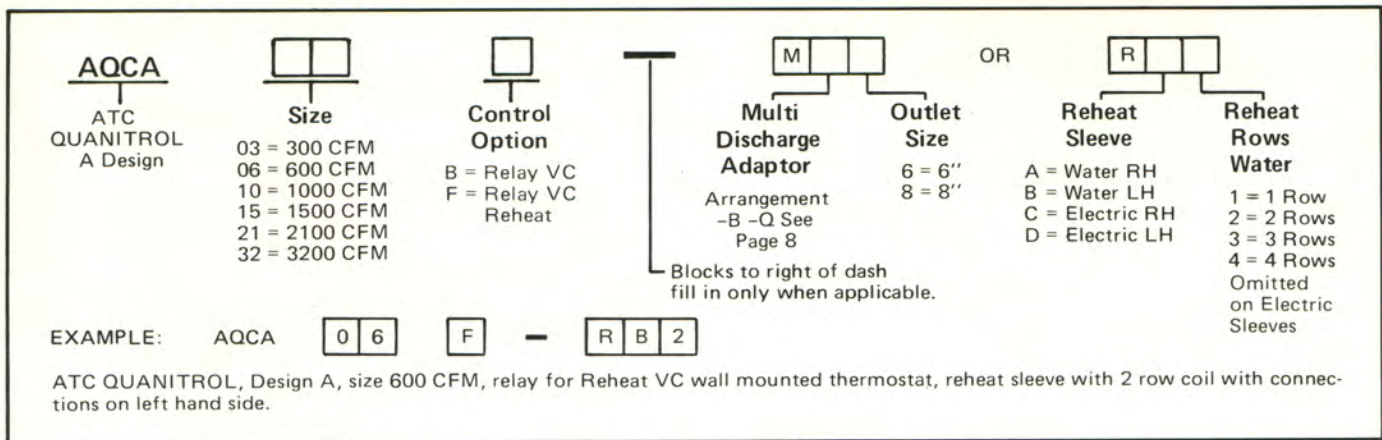
closing the bleed port. System energy now flows to the switch, closing it. This action can activate an electric duct heater, the solenoid or electric motorized valve of a hot water reheat coil. Staging can be accomplished by using multiple pressure switches at different settings.

## Application Information

QUANITROL is commonly applied to interior zones, where loads remain relatively constant. It is normally used in conjunction with linear slot diffusers for maximum performance. However, by exercising care in selection, Carnes conventional perforated or stamped square diffusers can be used.

QUANITROL is suspended from the floor above with hanger channels, making it independent from the ceiling grid. Thus, the aesthetically clean, crisp lines of modern ceiling architecture need not be interrupted.

# Model Numbering System



## Selection Procedure

The first consideration is to determine the zone size and the air and noise level requirements. Unit size is selected from the table below to meet the criteria. Lined duct can be added as required to meet room NC requirements.

## System Design

NOTE: The unit maximum CFM as listed in the performance data will produce the .5 inch pressure drop required to bring the unit into control. On system start-up, provision must be made to handle this air quantity momentarily until controlled operation is achieved and the valves close to their balance point.

## Performance Data

Size	CFM	SPD = .5			SPD = 1.0			SPD = 2.0			SPD = 3.0		
		PWL-NC Index	NC Lined Duct		PWL-NC Index	NC Lined Duct		PWL-NC Index	NC Lined Duct		PWL-NC Index	NC Lined Duct	
			0'	5'		0'	5'		0'	5'		0'	5'
03	50	L	L	L	26	L	L	37	25	L	42	35	L
	100	25	L	L	32	22	L	39	27	22	43	33	25
	150	29	L	L	36	26	23	40	30	24	43	33	25
	200	32	22	22	40	30	27	42	32	26	44	34	25
	250	37	27	25	44	34	31	46	36	32	48	38	34
	300	42	35	35	46	36	33	49	39	35	51	41	36
06	100	L	L	L	25	L	L	37	27	L	40	30	L
	200	26	L	L	35	22	22	40	28	24	44	34	25
	300	32	22	L	42	28	28	46	36	29	48	38	30
	400	38	25	25	45	32	32	47	37	32	50	40	32
	500	42	31	26	47	37	33	50	40	35	52	43	36
	600	45	35	27	50	38	34	53	42	37	55	44	40
10	200	22	L	L	25	L	L	35	25	L	48	38	27
	400	30	L	L	35	22	L	44	34	23	48	38	27
	600	35	22	22	42	28	28	47	37	33	52	42	35
	800	38	26	24	47	37	35	50	40	39	57	43	43
	1000	41	31	28	50	38	38	56	43	43	59	45	45
15	500	38	26	23	45	32	29	50	38	35	58	48	35
	750	40	28	25	47	35	32	55	43	40	62	52	42
	1000	42	30	27	50	38	35	60	48	45	65	53	50
	1250	44	32	29	51	39	36	62	50	47	66	54	51
	1500	45	33	30	51	39	36	63	51	48	67	55	53
21	600	32	21	L	44	32	21	52	39	35	56	45	35
	900	38	26	L	44	32	29	55	42	36	58	47	38
	1200	41	28	L	46	34	31	57	44	40	60	47	44
	1500	44	32	29	50	38	35	60	47	44	64	51	48
	1800	46	34	31	53	41	38	62	49	46	68	56	52
	2100	48	36	33	56	44	41	65	53	49	72	60	56
32	1200	39	27	25	47	35	33	55	43	41	56	44	42
	1600	41	29	27	48	36	34	60	48	46	62	50	48
	2000	43	31	29	51	39	37	62	50	48	68	56	54
	2400	46	34	32	54	42	40	64	52	50	70	58	56
	2800	51	39	37	55	43	41	64	52	50	70	58	56
	3200	55	43	41	57	45	43	64	52	50	70	58	56

NOTE: The static pressure drop through the box is 0.5" minimum for the required CFM. The external resistance, for connecting duct and terminal, must be added. For example; if a unit size 03 is handling 150 CFM, the system must provide 0.5" static pressure plus the external pressure drop for proper operation.

## Pressure Definition

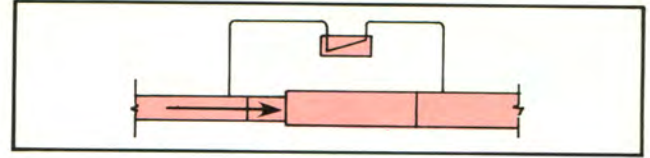
Static pressure drop (SPD = inches of water) is measured across the inlet and discharge openings of the unit. The total static pressure required at the inlet of the VAV unit for the required CFM is the sum of the tabulated static pressure drop plus the resistance of the downstream ductwork and outlets.

## Sound

PWL-NC Index indicates the sound power level (PWL) in decibels, re  $10^{-12}$  watt, radiated from the discharge end of the unit. By definition, the PWL-NC Index is a single number assigned to the PWL spectrum of a noise source indicating the minimum NC curve which will not be exceeded in any octave band (when subsequent attenuation is zero).

The NC (noise criteria, sound pressure level in decibels re 0.0002 microbar) which will result in the room served will be less than the tabulated decibels, depending upon:

- a. The attenuation of the system downstream of the unit, due to branches, lined duct and bends, and end reflection.



- b. The absorption of the room (RA) due to its acoustical characteristics.

NC values show the noise criteria which will result in the average room (PWL is re  $10^{-12}$  watt) under two conditions:

**0'** is based on no acoustically lined duct between the unit and room outlet, and all the air is discharged from one properly sized outlet.

**5'** is based on five feet of acoustically lined duct (1" thick and 1.5 pcf density) between the unit and room outlet, and a maximum of 600 CFM per outlet.

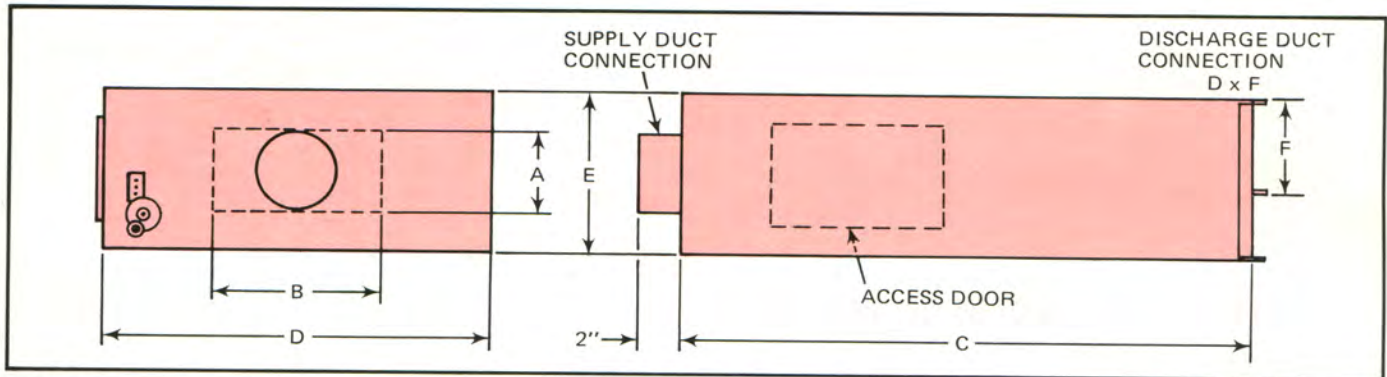
Rating "L" means that the PWL-NC index or NC will be less than 20 db.

## Maintenance

Carnes QUANITROL is designed to be essentially maintenance free. Moving parts are kept to an absolute minimum and even the parts that do move are not subject to

perceptible wear. Depending upon the amount of air borne dirt in the system, the filter/restrictor, located in the relay, may have to be replaced after several years of operation.

## Dimensions



**NOTES:** The discharge end is constructed for "S" and drive cleat attachment to duct by others.

Dimension D and F show discharge duct sizes.

Dimension F varies for reheat sleeve, see Accessory Dimensions.

Hanger channels supplied by Carnes, 2 per unit.

Unit Size	Nominal CFM	A*	C	D	E	F
03	300	5 Dia.	42	17	13	5
06	600	7 Dia.	48	22	13	6
10	1000	9 Dia.	60	30	16	7
15	1500	10 Dia.	60	30	16	10
		A x B				
21	2100	7 x 14	60	32	18	12
32	3200	8 x 20	60	40	18	14

\*Nominal supply duct connection.

## Guide Specifications

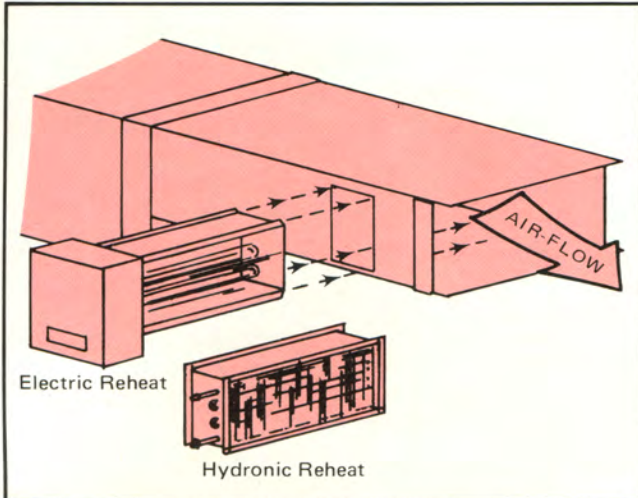
The contractor shall furnish and install Carnes QUANITROL variable air volume units that require no external power source to operate and use duct pressure to activate the single duct damper. Each unit shall deliver the capacity as specified in the equipment drawing schedule. The valve mechanism shall operate by duct pressure through a static pressure of 0.5" minimum to 6" maximum ( $\Delta P$  over the box, excluding downstream losses). Each unit shall operate at the NC level indicated on the attached schedule.

A bellows operated room thermostat shall be employed to regulate the QUANITROL unit to maintain the desired room conditions. The thermostat shall be capable of being mounted on the ceiling or wall and up to 50 feet away.

The QUANITROL casing shall be constructed of 20 ga. galvanized steel lined with minimum of 1" fiberglass. The unit air valve shall be constructed of extruded aluminum. The valve and attenuation chamber shall be specifically designed to insure minimum noise.

# Accessories

## Reheat Capabilities



The reheat sleeve fits directly onto the QUANITROL outlet. The sleeve can be fitted with either an electric resistance duct heater or hydronic coils up to four rows.

## Coil Selection

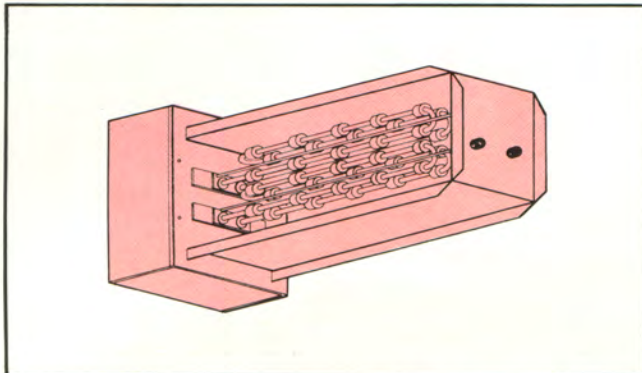
After the box size has been determined with the correct CFM, select the KW from the chart on page 8, not to exceed the maximum shown. The selection should be based upon the minimum or reset CFM. Select the supply voltage, control voltage and phasing from the standard voltages chart.

## Standard Voltages

If you order 10 or 30	You will get
110 V., 115 V., etc.	120 V.
200 V.	208 V.
220 V., 230 V., 236 V., etc.	240 V.
277 V.	277 V.
440 V., 460 V., etc.	480 V.

Ratings up to 500 V. will be furnished as ordered for custom heaters.

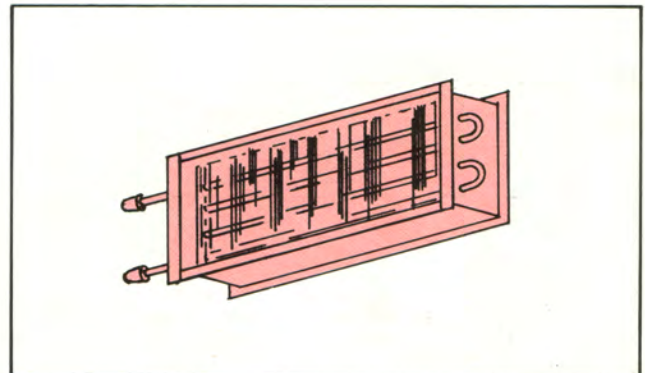
## Electric Reheat



Electric duct heaters can be furnished by Carnes or by others. When furnished by Carnes, heaters have an aluminized steel housing, grade A nickel chrome alloy resistance wire, ceramic insulators, primary and secondary protection and airflow switch.

Check local codes for application requirements.

## Hydronic Reheat



Hot water (or steam) coils have copper tubes and aluminum plate fins. Coils are available with up to four rows to provide sufficient heating capacity with low temperature water. Supplementary data showing detailed coil performance and air and water pressure drop is available.

## Reheat Sleeve Dimensions

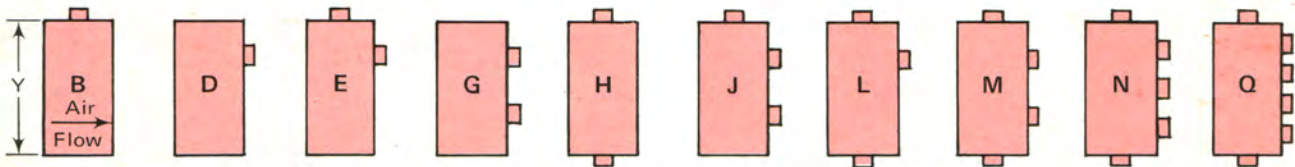
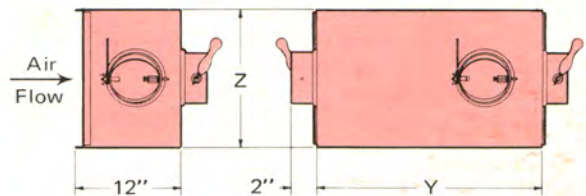
Size	D	E	F	G	H
03	17	8	5	6	13
06	22	8	5	6	13
10	30	8	5	6	16
15	30	10	5	8	16
21	32	12	5	10	18
32	40	14	6-1/8	12	18

**CFM/Max. KW Schedule**

<b>SIZE 03</b>	CFM Max. KW	150 1.3	200 2.0	250 2.6	300 3.5							
<b>SIZE 06</b>	CFM Max. KW	150 1.2	200 1.6	250 2.7	300 3.6	350 4.5	400 5.8	450 6.5	500 7.4	600 12.0		
<b>SIZE 10</b>	CFM Max. KW	300 3.0	400 4.3	500 6.0	600 8.3	700 10.0	800 12.0	900 13.7	1000 20.0			
<b>SIZE 15</b>	CFM Max. KW	600 6.5	800 9.0	1000 16.0	1200 18.0	1400 20.5	1500 30.0					
<b>SIZE 21</b>	CFM Max. KW	600 5.7	800 8.1	1000 11.7	1200 16.2	1400 20.7	1600 22.5	1800 26.0	2000 30.0	2100 32.0		
<b>SIZE 32</b>	CFM Max. KW	1000 8.5	1400 16.0	1600 19.0	1800 25.0	2000 28.0	2200 31.0	2400 36.0	2600 39.0	2800 42.0	3000 46.0	3200 48.0

**Multiple Discharge Adapter**

Multiple discharge adapters are available to fit all QUANITROL units. It is designed to be connected to the end of the QUANITROL unit. It is provided with up to six outlet necks for attachment of flexible ducts, each of which supplies a diffuser. The adapter is lined with 1/2" thick mat-faced fiber glass acoustical liner.



Arrangement	Number and Diameter of Outlets Available										Adaptor Dimensions	
	B	D	E	G	H	J	L	M	N	Q	Y	Z
Number of Outlets	1	1	2	2	2	3	3	4	5	6		
SIZE	03	6-8	6-8	6	6	6	6	—	—	—	17	13
	06	6-8	6-8	6-8	6-8	6-8	6-8	6-8	—	—	22	13
	10	—	—	6-8	6-8	6-8	6-8	6-8	6-8	—	30	16
	15	—	—	6-8	6-8	6-8	6-8	6-8	6-8	—	30	16
	21	—	—	—	—	—	8	8	8	8	—	32
32	—	—	—	—	—	—	—	8	8	8	40	18

**Standard Guarantee**

The Carnes Company guarantees all cataloged **Quantrol** units, to be free from defects in workmanship and materials for a period of one year from date of shipment. Any parts proving defective during this period will be replaced at Carnes' option, when returned to the factory, transportation charges prepaid.

Under no circumstances will Carnes Company be responsible for removal or reinstallation costs.

**Performance Guarantee**

The Carnes Company guarantees all Carnes **Quantrol** units to perform in accordance with the published data as set forth in published catalogs and bulletins.

No warranties, expressed or implied, other than those set forth herein, shall be binding upon the company, nor shall the company be liable for consequent damage or delays caused by defective material or objectionable performance.

Carnes reserves the right to change specifications and design without notice.

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