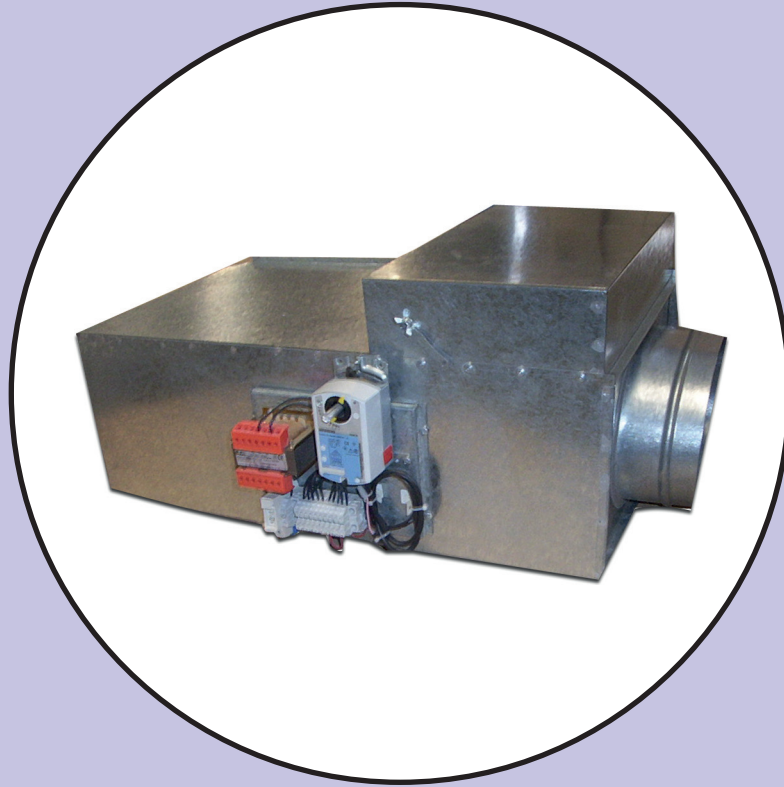


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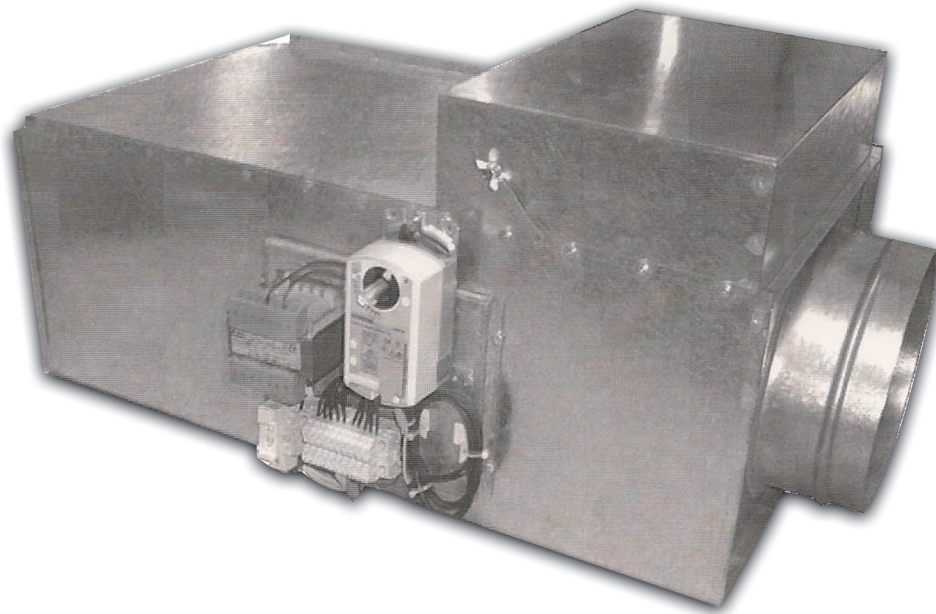
شركة الخليج لفتحات التكييف المركزي

GULF GRILLES CO.



VARIABLE
AIR VOLUME BOXES

B08
VARIABLE
AIR VOLUME BOXES



The GGC Model VAD90, by-pass VAV, provides pressure dependent and independent variable air volumes to individual zones while by-passing the unneeded air to the ceiling plenum for recirculation.

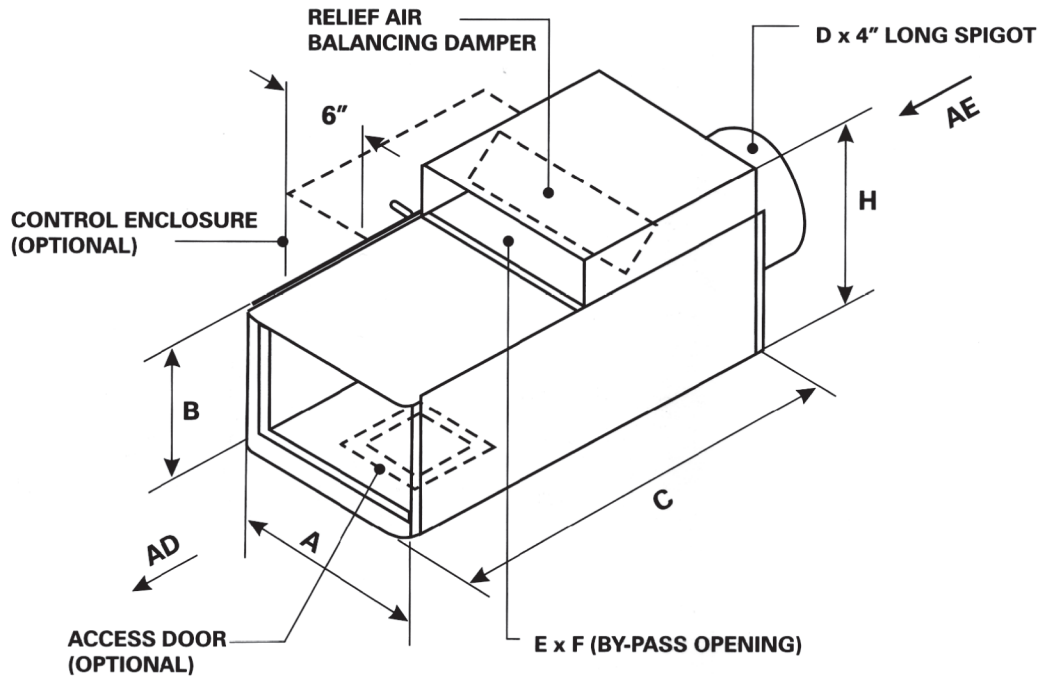
Although zone air volume in small buildings may vary greatly, the cost of fan controls many times cannot be justified. Zone variable air volumes are realized with the by-pass unit while the supply fan delivers a constant CFM.

The model is compatible with reverse or direct acting electric/electronic thermostats. Zone thermostats directly control the by-pass damper assuring that the required amount of air needed is delivered to the zone.

Down stream ductwork pressure losses can be matched by adjusting an integral by-pass type balancing damper.

Other Features Include :

- Airflow capacities from full shut-off zone to 2,500 CFM.
- Electronic, electric or manual damper control.
- Low pressure drop.
- Low sound levels.
- Thermally and acoustically insulated casing.
- Open-end discharge provided with slip and drive connection for easy installation.
- Optional multi-discharge adaptors has round/oval outlet connections with integral balancing damper.
- Balancing damper in by-pass is standard.
- Averaging airflow sensor for the type pressure independent at the inlet is standard.
- Optional hanger brackets.
- Optional control enclosure for electric control.
- Optional internal foil coated insulation (for applications of hospitals and laboratories etc.)
- Optional heating/cooling change over sensor.
- Wiring diagrams will be furnished for all types of VAV's.



PRODUCT DESCRIPTION

- The complete casing with by-pass damper section is made up of 22 gauge zinc coated mill galvanized steel.
- 1" thick fiberglass 24 kg/mt.³ densities comfortably acting as acoustic attenuator and thermal resistant barrier insulate the casing.
- The VAV damper blade and control shaft (3/8"- ϕ) are extruded aluminum mechanically keyed together as a single piece.
- Operation of blade by maintenance free nylon bearings for smooth and noiseless operation and the damper closing against a gasket seal.

VAD90	02C	04C	06C	08C	10C	12C	14C
CFM RANGE	125-250	250-475	350-725	475-1000	700-1450	1000-1950	1250-2500

DIMENSIONS LISTED IN INCHES - BASIC ASSEMBLY

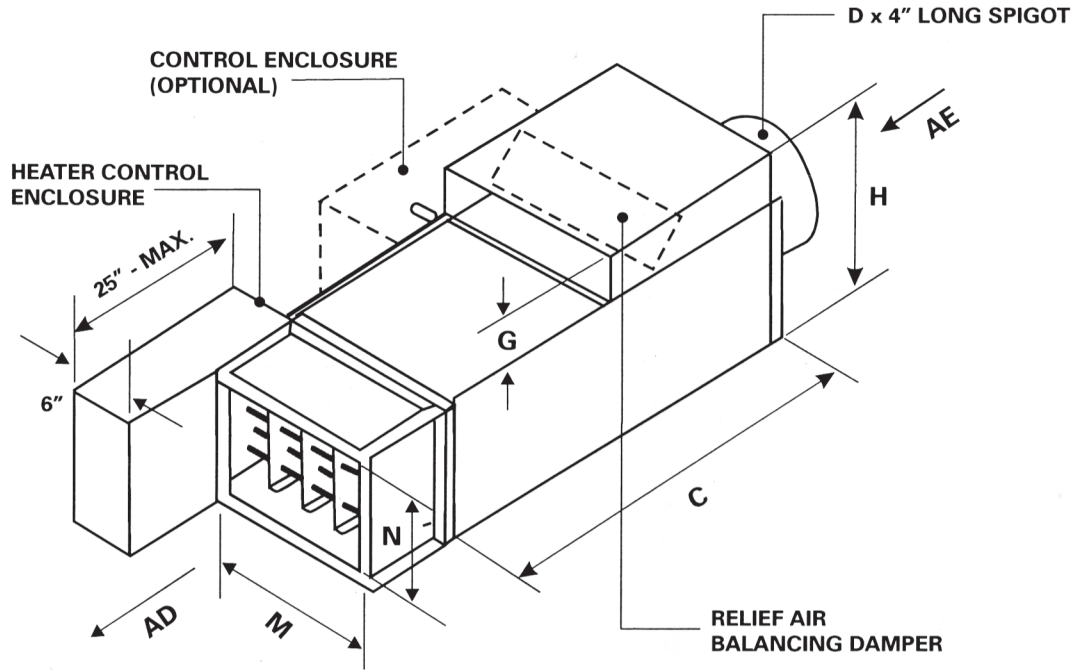
UNIT MODEL	DISCHARGE		LENGTH C	COLLAR DIA- ϕ -D	EQUIVALENT OVAL SIZE-O	BY-PASS OPENING		H
	A	B				E	F	
VAD90-02C	12	10	24	6	N/A	12	4	14
VAD90-04C	12	10	24	8	N/A	12	4	14
VAD90-06C	12	10	24	9*	7 7/8 x 9 7/16	12	4	14
VAD90-08C	17	10	30	10*	7 7/8 x 11 1/32	17	4	14
VAD90-10C	17	10	30	12*	7 7/8 x 14 3/16	17	4	14
VAD90-12C	27	10	36	14*	7 7/8 x 17 5/16	27	4 1/2	14 1/2
VAD90-14C	34	10	36	16*	7 7/8 x 20 1/2	34	4 1/2	14 1/2

AE : Air Flow Enter, AD: Air Flow Discharge.

*Provided with flat oval collar. All other collars are round.

Oval Size - O: H x W - height x width of oval collar.

N/A : Not Available.



PRODUCT DESCRIPTION

- The complete casing with by-pass damper section is made up of 22 gauge zinc coated mill galvanized steel.
- 1" thick fiberglass 24 kg/mt.³ densities comfortably acting as acoustic attenuator and thermal resistant barrier insulate the casing.
- The VAV damper blade and control shaft (3/8"- ϕ) are extruded aluminum mechanically keyed together as a single piece.
- Operation of blade by maintenance free nylon bearings for smooth and noiseless operation and the damper closing against a gasket seal.

VAD90	02CH	04CH	06CH	08CH	10CH	12CH	14CH
CFM RANGE	125-250	250-475	350-725	475-1000	700-1450	1000-1950	1250-2500

DIMENSIONS LISTED IN INCHES - BASIC ASSEMBLY								
UNIT MODEL	DISCHARGE		LENGTH C	COLLAR DIA- ϕ -D	EQUIVALENT OVAL SIZE-O	HEATING COIL MxN	H	G
	A	B						
VAD90-02CH	12	10	24	6	N/A	11 x 8	14	4
VAD90-04CH	12	10	24	8	N/A	11 x 8	14	4
VAD90-06CH	12	10	24	9*	7 7/8 x 9 7/16	11 x 8	14	4
VAD90-08CH	17	10	30	10*	7 7/8 x 11 1/32	16 x 8	14	4
VAD90-10CH	17	10	30	12*	7 7/8 x 14 3/16	16 x 8	14	4
VAD90-12CH	27	10	36	14*	7 7/8 x 17 5/16	26 x 8	14 1/2	4 1/2
VAD90-14CH	34	10	36	16*	7 7/8 x 20 1/2	33 x 8	14 1/2	4 1/2

AE : Air Flow Enter, AD: Air Flow Discharge.

*Provided with flat oval collar. All other collars are round.

Oval Size - O: H x W - height x width of oval collar.

N/A : Not Available.

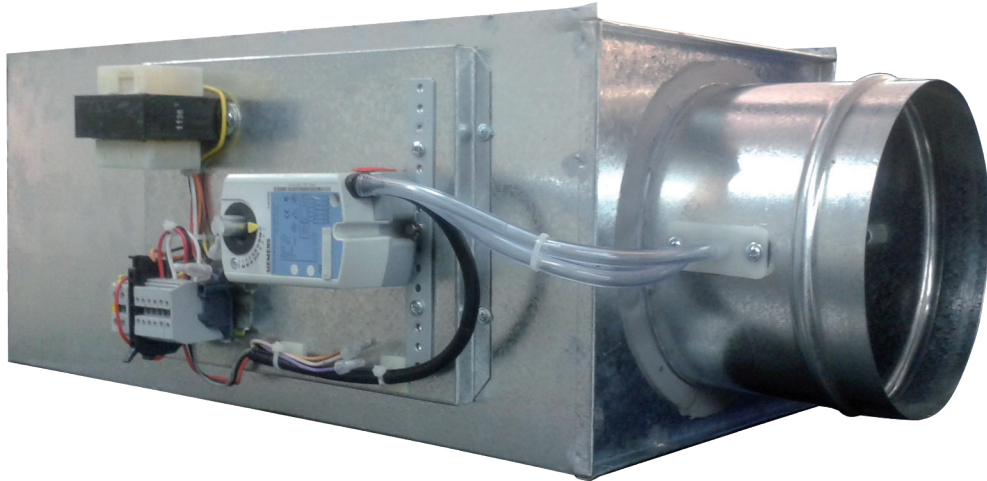
**VARIABLE AIR VOLUME
PERFORMANCE DATA
SINGLE DUCT BY - PASS VAV WITH AND WITHOUT HEATER**

SOUND POWER LEVEL DATA FOR UNIT MODELS WITH AND WITHOUT HEATER

AIR FLOW	STATIC PRESSURE	SOUND POWER LEVEL (dB) OCTAVE BAND							
		CFM	IN. W.G.	125	250	500	1000	2000	4000
UNIT MODEL VAD90-02C & CH									
125	0.025	-	-	-	-	-	-	-	-
175	0.041	-	-	-	-	-	-	-	-
200	0.055	-	-	-	-	-	-	-	-
UNIT MODEL VAD90-04C & CH									
250	0.032	-	-	-	-	-	-	-	-
300	0.052	-	-	-	-	-	-	-	-
375	0.065	46	44	40	36	32	25	20	
UNIT MODEL VAD90-06C & CH									
425	0.035	-	-	-	-	-	-	-	-
500	0.050	45	42	38	33	30	26	20	
600	0.070	48	45	42	38	32	28	22	
UNIT MODEL VAD90-08C & CH									
650	0.045	-	-	-	-	-	-	-	-
800	0.070	52	50	45	40	36	34	30	
900	0.090	55	54	50	45	39	36	28	
UNIT MODEL VAD90-10C & CH									
800	0.045	48	46	42	38	35	30	26	
1000	0.072	50	49	47	42	40	38	32	
1200	0.096	55	52	50	49	45	41	36	
UNIT MODEL VAD90-12C & CH									
1250	0.045	50	48	45	42	39	35	30	
1500	0.062	52	50	44	46	42	40	33	
1750	0.080	58	55	54	52	49	45	40	
UNIT MODEL VAD90-14C & CH									
1600	0.058	52	49	48	44	40	36	31	
2000	0.085	55	53	50	48	45	42	40	
2500	0.120	60	58	57	55	52	49	44	

NOTES:

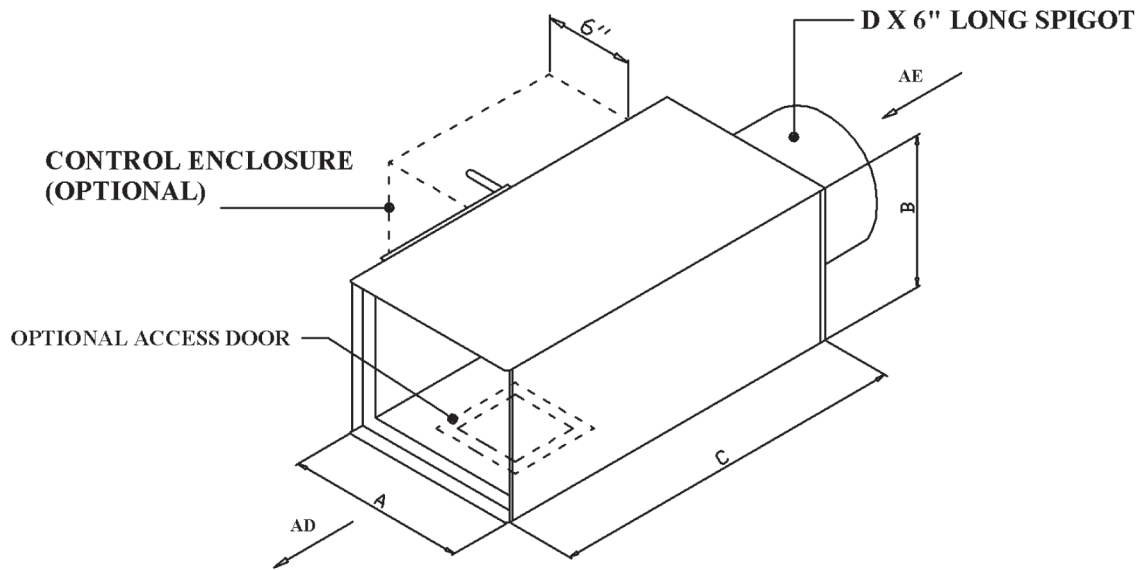
- Static pressure is minimum pressure drop through the unit for given airflow.
- - Denotes unit within 5 dB of background in test room for sound power level.
- NC ratings are for terminal units without additional attenuation in low velocity duct.
- GGC recommends that a balancing damper be installed three (3) feet upstream from inlet of the terminal unit to avoid excessive pressure where required.
- Full shut off can be attempt by all units except for units with pressure independent controls "range" is needed.
- Add heater pressure drop with above static pressure for units with heater from our Air Velocity-Vs-Pressure drop graph (see page 22-09).



The GGC Model VAD90, without bypass is manufactured to provide wide range of airflow requirements. The units are available in different sizes to supply air flow from full shut - off to 10,000 CFM.

Other Features Include:

- Electronic, Electric or manual damper control.
- Low pressure drop
- Low sound levels.
- Thermally and acoustically insulated casing.
- Open end discharge, provided with slip and drive connection for easy installation.
- Optional hanger brackets.
- Optional control enclosure for electric control
- For low, medium or high pressure applications, able to operate throughout a wide range of HVAC systems.
- Optional multi-discharge adaptors having round/oval outlet connections with integral balancing damper.
- Optional internal foil coated insulation (for applications of hospitals and laboratories etc.
- Optional heating/cooling change over sensor.
- Wiring diagrams will be furnished for all types of VAV's.
- Compact unit casing sizes accommodates installation in reduced ceiling plenum space.



PRODUCT DESCRIPTION:

- 22 gauge zinc coated mill galvanized steel casing construction, providing strength and product durability
- 1" thick 24 kg/m³ fiberglass insulation with black facing which acts as acoustic attenuator and thermal resistant barrier.
- Multi-point averaging type flow sensor for pressure independent applications.
- All standard outlet connections are rectangular and require a slip and drive duct connection for installation.
- The damper blade and control shaft (3/8"-0) are extruded aluminum mechanically keyed together as a single piece.
- Blade operation by maintenance free nylon bearings for smooth and noiseless operation.

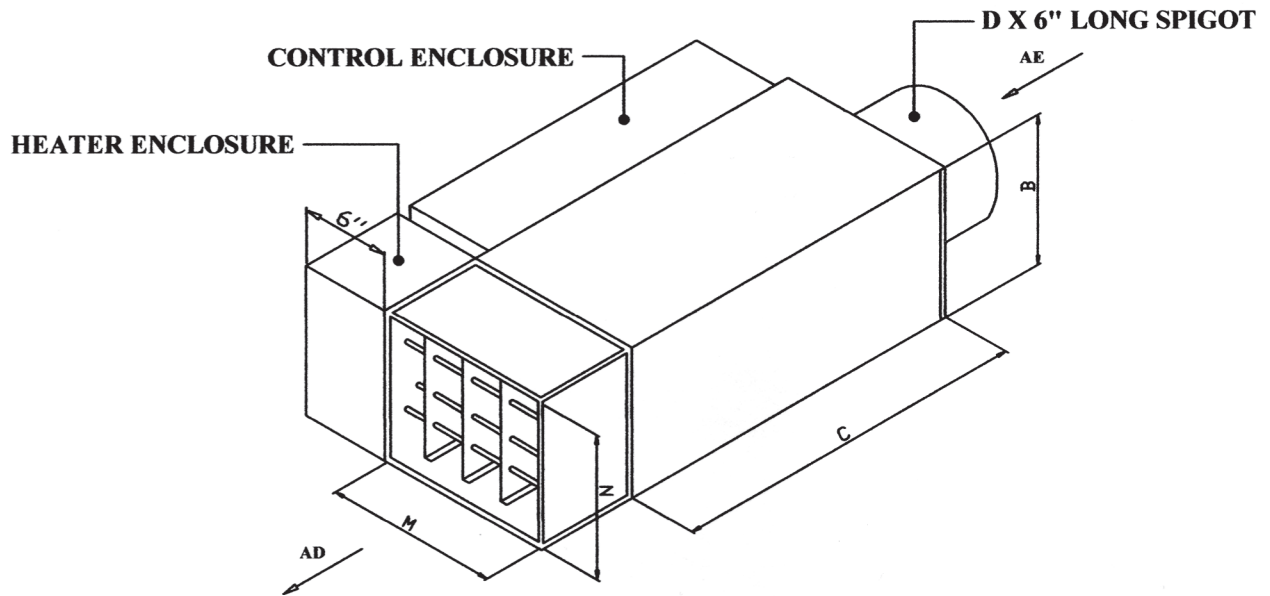
DIMENSIONS LISTED IN INCHES - BASIC ASSEMBLY

MODEL	CFM	DISCHARGE		LENGTH	COLLAR	EQUIVALENT
	RANGE	A	B	C	DIA - ϕ - D	OVAL SIZE - O
VAD90-02E	90 - 400	10	10	24	5	N/A
VAD90-04E	130 - 600	10	10	24	6	N/A
VAD90-06E	175 - 800	12	10	24	7	N/A
VAD90-08E	200 - 1000	12	10	24	8	N/A
VAD90-10E	310 - 1500	14	10	24	10*	77/8" X 09 7/16
VAD90-12E	410 - 2000	16	10	24	12*	77/8" X 11 3/16
VAD90-14E	610 - 3000	22	10	24	14*	77/8" X 14 3/16
VAD90-16E	810 - 4000	28	10	24	16*	77/8" X 17 5/16
VAD90-18E	1000 - 5000	36	10	24	18*	77/8" X 20 7/16
VAD90-20E	1400 - 7000	28	18	24	20*	15 7/8" X 22 5/32
VAD90-22E	1950 - 10000	36	18	24	24*	15 7/8" X 28 5/32

AE: Air Flow Enter, **AD:** Air Flow Discharge.

*Provided with flat oval collar. All other collars are round.

Oval Size- O: H X W - Height X Width of oval collar. **N/A:** Not Available.



PRODUCT DESCRIPTION:

- 22 gauge zinc coated mill galvanized steel casing construction, providing strength and product durability
- 1" thick 24 kg/m³ fiberglass insulation with black facing which acts as acoustic attenuator and thermal resistant barrier.
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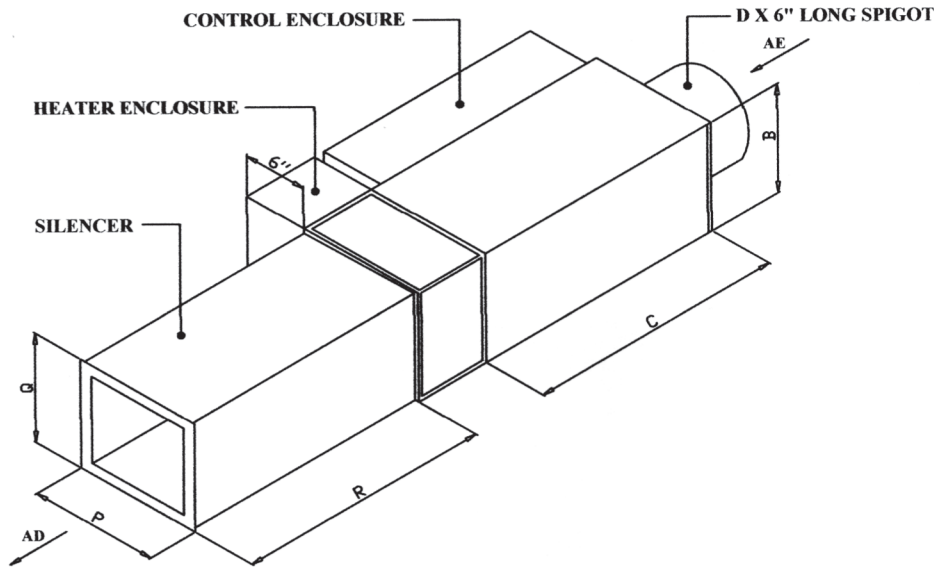
DIMENSIONS LISTED IN INCHES - BASIC ASSEMBLY

MODEL	CFM	DISCHARGE		LENGTH C	COLLAR	EQUIVALENT	HEATING COIL
	RANGE	A	B		DIA - Ø - D	OVAL SIZE - O	M X N
VAD90-02EH	90 - 400	10	10	24	5	N/A	8 X 8
VAD90-04EH	130 - 600	10	10	24	6	N/A	8 X 8
VAD90-06EH	175 - 800	12	10	24	7	N/A	10 X 8
VAD90-08EH	200 - 1000	12	10	24	8	N/A	10 X 8
VAD90-10EH	310 - 1500	14	10	24	10*	77/8" X 09 7/16	12 X 8
VAD90-12EH	410 - 2000	16	10	24	12*	77/8" X 11 3/16	14 X 8
VAD90-14EH	610 - 3000	22	10	24	14*	77/8" X 14 3/16	20 X 8
VAD90-16EH	810 - 4000	28	10	24	16*	77/8" X 17 5/16	26 X 8
VAD90-18EH	1000 - 5000	36	10	24	18*	77/8" X 20 7/16	34 X 8
VAD90-20EH	1400 - 7000	28	18	24	20*	15 7/8" X 22 5/32	26 X 16
VAD90-22EH	1950 - 10000	36	18	24	24*	15 7/8" X 28 5/32	34 X 16

AE: Air Flow Enter, **AD:** Air Flow Discharge.

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PRODUCT DESCRIPTION:

- 22 gauge zinc coated mill galvanized steel casing construction, providing strength and product durability
- 1" thick 24 kg/m³ fiberglass insulation with black facing which acts as acoustic attenuator and thermal resistant barrier.
- Multi-point averaging type flow sensor for pressure independent applications.
- All standard outlet connections are rectangular and require a slip and drive duct connection for installation.
- The damper blade and control shaft (3/8"-0) are extruded aluminum mechanically keyed together as a single piece.
- Blade operation by maintenance free nylon bearings for smooth and noiseless operation.

DIMENSIONS LISTED IN INCHES - BASIC ASSEMBLY

MODEL	CFM	DISCHARGE		LENGTH	COLLAR	EQUIVALENT	SILENCER SIZE		
	RANGE	A	B	C	DIA - Ø - D	OVAL SIZE - O	P	Q	R
VAD90-02EHS	90 - 400	10	10	24	5	N/A	8	8	24
VAD90-04EHS	130 - 600	10	10	24	6	N/A	8	8	24
VAD90-06EHS	175 - 800	12	10	24	7	N/A	10	8	24
VAD90-08EHS	200 - 1000	12	10	24	8	N/A	10	8	24
VAD90-10EHS	310 - 1500	14	10	24	10*	77/8" X 09 7/16	12	8	24
VAD90-12EHS	410 - 2000	16	10	24	12*	77/8" X 11 3/16	14	8	24
VAD90-14EHS	610 - 3000	22	10	24	14*	77/8" X 14 3/16	20	8	24
VAD90-16EHS	810 - 4000	28	10	24	16*	77/8" X 17 5/16	26	8	24
VAD90-18EHS	1000 - 5000	36	10	24	18*	77/8" X 20 7/16	34	8	24
VAD90-20EHS	1400 - 7000	28	18	24	20*	15 7/8" X 22 5/32	26	16	24
VAD90-22EHS	1950 - 10000	36	18	24	24*	15 7/8" X 28 5/32	34	16	24

AE: Air Flow Enter, **AD:** Air Flow Discharge.

*Provided with flat oval collar. All other collars are round.

Oval Size- O: H X W - Height X Width of oval collar. **N/A:** Not Available.



VARIABLE AIR VOLUME STANDARD CONSTRUCTION FESATURE SINGLE DUCT TERMINAL VAV WITH AND WITHOUT HEATER

SIZE DIA	AIR FLOW	FULL OPEN ▲ PS	NOISE CRITERIA (NC) FOR INLET PRESSURES(▲ PS)															
			Full Open				Min+0.35"				Min + 1.5"				Min + 3"			
			without heater		with heater		without heater		with heater		without heater		with heater		without heater		with heater	
inches	cfm	" w.g	R	D	R	D	R	D	R	D	R	D	R	D	R	D	R	D
5	80	0.000	-	-	-	-	-	-	-	-	-	22	15	26	24	34	27	38
	160	0.000	-	-	-	-	-	16	17	18	18	26	20	29	29	38	31	41
	240	0.000	-	-	-	-	-	16	17	19	22	26	24	31	36	38	37	42
	320	0.000	-	-	-	-	16	20	16	24	25	30	28	36	38	45	40	49
	400	0.000	18	16	18	21	21	25	24	29	28	34	33	39	38	46	41	52
6	120	0.000	-	-	-	-	-	-	-	-	-	21	15	25	28	36	30	39
	240	0.000	-	-	-	-	-	-	-	-	18	22	19	26	31	37	33	40
	360	0.000	-	-	-	-	-	-	-	16	21	25	24	29	34	39	38	44
	480	0.010	-	-	-	-	18	19	18	22	26	27	27	33	39	38	38	44
	600	0.010	18	18	19	22	21	21	22	26	29	28	31	36	39	38	40	45
7	160	0.000	-	-	-	-	-	-	-	-	-	-	-	-	26	16	29	20
	320	0.000	-	-	-	-	-	-	-	-	-	-	-	16	26	15	26	18
	480	0.000	-	-	-	-	-	-	-	-	18	-	16	16	30	19	30	24
	640	0.000	-	-	-	-	-	-	-	-	21	17	21	21	31	28	31	31
	800	0.000	15	-	-	16	20	17	19	21	25	22	25	28	31	29	32	34
8	200	0.010	-	-	-	-	-	-	-	-	-	22	-	24	26	35	28	36
	400	0.020	-	-	-	-	-	-	-	-	18	24	18	25	31	40	32	41
	600	0.030	-	-	-	-	-	15	-	15	22	26	24	29	38	41	39	44
	800	0.040	-	17	-	19	16	24	15	25	25	34	27	38	37	46	39	51
	1000	0.070	16	24	16	26	19	28	20	31	28	38	30	42	39	50	42	56
10	300	0.000	-	-	-	-	-	-	-	-	16	19	16	22	29	33	29	37
	600	0.010	-	-	-	-	-	-	-	-	20	21	21	25	37	38	37	41
	900	0.030	-	-	-	-	-	16	-	19	24	29	25	34	39	46	40	51
	1200	0.040	-	-	-	-	15	18	16	21	26	34	28	38	41	55	44	59
	1500	0.070	16	19	16	22	20	26	22	30	27	38	31	42	39	53	42	59
12	400	0.000	-	-	-	-	-	-	-	-	16	21	18	25	37	40	38	44
	800	4.000	-	-	-	-	-	-	-	15	19	28	20	31	36	48	38	49
	1200	0.110	-	-	-	-	-	15	-	15	22	31	25	34	39	53	41	56
	1600	0.190	-	16	-	17	15	21	16	24	25	36	27	40	42	58	45	61
	2000	0.290	15	21	16	24	19	25	21	29	28	36	31	41	40	52	44	58
14	600	0.020	-	-	-	-	-	-	-	-	20	20	20	24	39	44	42	53
	1200	0.050	-	-	-	-	-	-	-	-	22	26	24	28	40	46	42	48
	1800	0.100	-	-	-	-	15	18	16	21	26	32	28	35	40	50	42	53
	2400	0.170	15	17	15	18	22	24	24	27	29	35	33	39	40	50	44	55
	3000	0.260	22	24	24	28	27	28	29	33	33	38	37	44	41	50	46	58
16	800	0.010	-	-	-	-	-	-	-	15	15	21	20	22	34	36	35	38
	1600	0.090	-	-	-	-	-	-	-	-	22	30	24	31	41	53	42	55
	2400	0.190	-	-	-	-	18	17	18	20	31	35	33	38	49	59	54	61
	3200	0.330	25	21	25	25	25	22	26	27	34	35	37	40	48	52	51	56
	4000	0.520	32	29	33	32	32	30	34	34	37	38	41	44	45	48	49	55
18	1000	0.000	-	-	-	-	-	16	-	19	15	22	16	24	36	38	38	40
	2000	0.100	-	-	-	-	-	15	-	18	25	30	27	33	41	52	42	55
	3000	0.210	16	-	15	15	20	19	21	22	34	39	37	40	52	58	57	61
	4000	0.370	26	24	26	26	27	25	27	28	37	38	40	42	49	55	56	60
	5000	0.560	33	30	36	36	34	31	37	36	40	39	45	46	48	49	55	57
20	1400	0.010	-	-	-	-	-	17	-	17	20	34	22	35	42	56	46	59
	2800	0.060	-	-	-	-	-	18	-	18	27	35	29	38	49	58	54	62
	4200	0.140	18	17	18	18	19	21	20	22	31	35	33	38	48	53	51	57
	5600	0.240	27	28	28	30	27	29	29	31	33	36	38	41	41	46	47	52
	7000	0.350	33	34	37	38	34	34	37	38	38	37	42	44	42	42	47	49
22	2000	0.020	-	-	-	-	-	19	-	19	25	35	28	39	47	59	52	65
	4000	0.100	-	-	-	-	16	18	16	19	31	36	33	39	53	60	56	62
	6000	0.210	21	22	21	24	24	25	25	26	37	39	39	42	54	58	59	62
	8000	0.370	31	29	32	31	31	30	33	32	39	39	42	44	49	50	54	56
	10000	0.560	38	36	41	40	38	36	41	40	42	41	47	48	47	48	52	55

VARIABLE AIR VOLUME STANDARD CONSTRUCTION FEATURE SINGLE DUCT TERMINAL VAV WITH AND WITHOUT HEATER

DISCHARGE SOUND PERFORMANCE DATA

SIZE DIA. IN	AIRFLOW		FULL OPEN PRESSURE DROP		OCTAVE BAND SOUND POWER, LW																							
					FULL OPEN S.P.							Min. + 0.35"							Min. + 1.5"							3"		
	CFM	l/s	S. P.	T. P.	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
5	100	47	0.00	0.03	41	29	-	-	-	-	45	49	42	33	22	23	49	55	52	47	40	39	51	58	53	52	45	46
	200	94	0.00	0.12	41	42	33	32	20	16	51	55	48	40	30	28	58	61	56	50	42	42	59	66	59	55	48	47
	300	142	0.00	0.31	47	56	52	56	48	48	57	60	53	45	35	34	66	68	60	55	46	46	68	0.7	63	59	51	52
	400	189	0.00	0.55	56	57	51	50	36	31	62	64	58	51	39	38	70	72	64	58	51	49	73	76	67	62	52	55
6	200	94	0.00	0.06	-	-	32	27	19	-	45	51	44	37	28	27	55	60	54	48	39	41	56	64	57	54	46	47
	300	142	0.00	0.14	40	44	34	32	21	19	50	55	47	41	31	32	59	64	57	51	43	45	62	68	61	57	46	51
	450	212	0.01	0.34	52	53	45	43	28	26	56	61	54	46	36	38	63	68	61	54	46	50	67	70	64	60	51	53
	600	283	0.01	0.58	58	63	54	51	36	36	61	64	60	52	40	41	66	70	65	58	49	54	72	75	68	63	54	59
7	200	94	0.00	0.03	-	-	-	-	-	-	44	33	27	25	24	22	48	38	36	30	36	36	57	58	57	31	52	49
	400	189	0.00	0.15	43	37	31	22	19	14	49	40	34	23	25	21	53	48	44	35	31	36	66	65	63	56	55	54
	600	283	0.00	0.32	48	70	33	25	26	21	53	47	40	30	24	23	59	53	48	38	34	26	71	70	69	60	59	60
	800	377	0.00	0.56	55	49	41	33	26	27	58	55	45	35	30	29	62	57	52	42	37	29	74	74	71	83	62	83
8	300	142	0.01	0.06	-	30	28	19	-	-	51	46	44	36	33	30	60	56	55	48	46	44	63	60	57	54	52	54
	500	236	0.02	0.16	47	43	40	33	25	19	56	51	49	40	38	35	65	64	57	51	50	49	70	67	84	58	56	57
	750	354	0.04	0.34	57	54	49	43	37	33	62	57	55	48	44	42	70	66	62	56	54	55	74	72	68	63	60	82
	1000	472	0.07	0.59	64	60	57	51	45	41	67	62	60	52	49	48	75	72	66	60	55	56	76	74	70	63	59	62
10	450	212	0.00	0.05	-	32	28	22	-	-	51	50	45	38	34	32	60	59	56	52	48	47	60	61	79	56	54	53
	750	354	0.02	0.14	44	42	37	31	22	17	55	53	50	42	39	38	65	64	61	53	51	52	69	70	66	60	57	58
	1150	542	0.04	0.30	53	51	47	42	36	31	60	58	56	48	45	43	70	69	63	57	54	55	74	75	69	62	61	72
	1500	708	0.07	0.53	61	60	56	51	45	41	66	65	60	55	49	48	74	72	66	60	57	56	78	77	71	84	62	81
12	800	377	0.04	0.10	42	39	34	26	20	17	53	52	49	41	38	36	64	65	60	54	53	52	69	71	65	61	58	62
	1200	566	0.12	0.25	50	48	44	41	31	28	56	57	51	45	43	41	71	68	62	57	55	54	75	73	70	62	61	62
	1600	755	0.18	0.46	59	56	50	48	41	37	62	63	57	50	49	46	75	71	67	61	57	58	76	77	72	66	63	63
	2000	943	0.30	0.68	64	62	57	54	47	45	67	66	62	57	53	52	75	73	70	62	60	61	82	80	75	66	65	84
14	1000	472	0.05	0.09	42	37	28	24	19	15	51	53	49	42	36	36	64	65	62	57	53	54	71	70	65	63	63	64
	1500	708	0.08	0.20	48	47	41	39	29	23	57	58	53	46	43	41	68	68	63	57	55	56	73	74	70	66	61	65
	2250	1061	0.15	0.41	59	59	53	50	44	41	64	65	61	54	49	47	72	72	69	61	59	56	61	79	72	67	63	66
	3000	1415	0.27	0.74	66	64	62	58	50	48	68	70	65	61	56	54	78	75	71	67	62	63	83	82	77	70	67	67
16	1000	472	0.03	0.06	-	32	26	18	17	14	52	54	49	37	34	32	62	60	56	55	47	46	63	62	61	58	56	57
	2000	943	0.14	0.25	52	51	45	41	33	27	56	57	52	44	39	34	73	72	69	60	57	55	77	76	75	68	62	66
	3000	1415	0.28	0.57	63	62	60	53	44	42	65	65	62	55	48	44	76	75	72	64	57	58	77	79	75	65	61	64
	4000	1887	0.51	1.04	71	73	69	63	54	52	72	73	69	63	56	53	77	78	74	68	61	62	77	78	73	66	62	64
18	1250	590	0.03	0.06	-	35	28	21	19	17	55	54	51	42	35	32	64	62	59	56	51	48	65	64	62	62	57	58
	2500	1179	0.15	0.25	53	55	49	42	35	27	59	60	54	48	40	37	74	75	71	65	58	56	78	61	75	68	64	66
	3750	1769	0.31	0.61	65	57	62	56	48	42	67	68	62	58	47	46	77	81	74	66	60	59	77	61	75	66	62	64
	5000	2358	0.55	1.07	72	74	71	65	56	54	74	75	71	66	56	54	81	82	76	72	63	60	78	77	75	67	63	62
20	1750	825	0.02	0.06	41	38	31	25	16	22	57	56	51	41	35	32	72	73	66	57	52	56	72	73	71	65	61	66
	3500	1651	0.08	0.24	59	56	52	46	33	35	62	60	54	48	42	41	76	78	72	61	58	61	80	62	75	68	64	70
	5200	2453	0.21	0.56	69	68	62	58	52	52	71	70	65	58	53	51	79	78	73	67	61	62	81	61	74	69	65	64
	7000	3302	0.36	0.99	78	77	72	67	61	63	78	77	73	68	61	63	80	81	74	71	65	67	82	83	75	72	66	65
24	2500	1179	0.05	0.08	46	42	37	29	21	16	63	61	53	44	39	37	74	75	71	60	56	64	75	77	74	66	65	69
	5000	2358	0.15	0.31	62	61	57	51	44	42	66	65	60	54	47	46	81	80	75	67	63	65	82	63	77	71	66	70
	7000	3302	0.31	0.69	74	73	67	63	57	56	75	74	69	64	56	57	81	83	76	71	65	68	81	83	76	72	65	67
	10000	4717	0.55	1.20	80	82	74	70	65	66	80	82	77	71	66	68	85	84	80	74	70	72	85	65	80	74	70	72

Performance Notes:

1. Discharge sound power is the noise emitted from the unit discharge into the downstream duct.
2. Sound power levels are in decibels, dB re 10⁻¹² watts.
3. Sound power values less than the sound pressure values of an NC are represented by (-).
4. The total pressure is the sum of the inlet static pressure and the drop in velocity pressure from the inlet to the outlet of the unit.



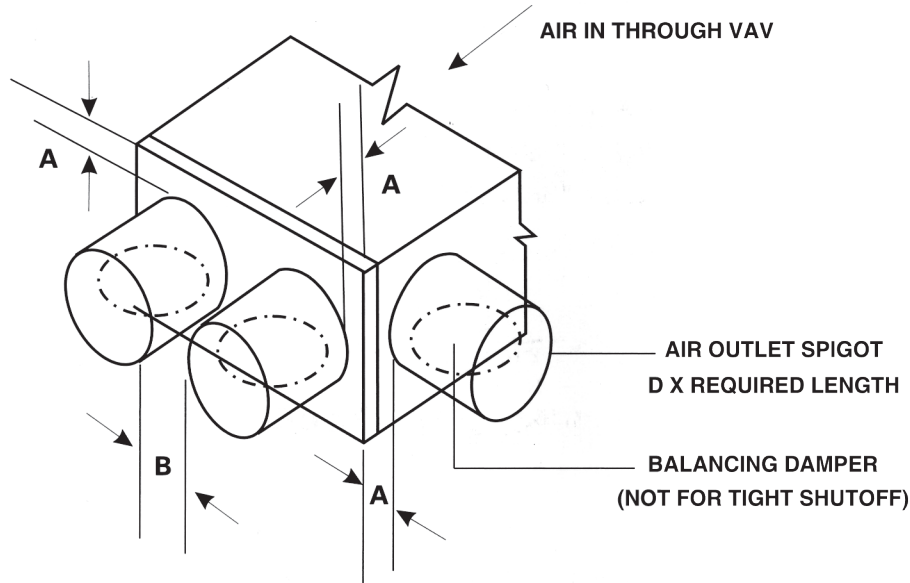
VARIABLE AIR VOLUME STANDARD CONSTRUCTION FEATURE SINGLE DUCT TERMINAL VAV WITH AND WITHOUT HEATER

RADIATED SOUND PERFORMANCE DATA

SIZE DIA. IN	AIRFLOW		FULL OPEN PRESSURE DROP		OCTAVE BAND SOUND POWER, LW																							
					FULL OPEN S.P.							Min. + 0.35"							Min. + 1.5"							3"		
	CFM	l/s	S. P.	T. P.	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
5	100	47	0.00	0.03	-	-	-	-	-	-	51	37	27	18	-	-	47	35	31	30	28	19	44	39	37	37	42	31
	200	94	0.00	0.12	39	34	26	19	16	-	44	37	31	23	19	13	54	46	44	37	34	22	51	49	44	39	45	32
	300	142	0.00	0.31	47	44	31	30	27	19	47	45	38	31	27	17	52	51	47	39	37	26	60	54	48	43	46	33
	400	189	0.00	0.55	55	50	43	38	33	24	54	51	44	38	34	25	59	55	48	42	39	26	66	62	53	46	49	35
6	200	94	0.00	0.06	-	30	-	-	-	-	42	37	29	20	19	14	49	44	39	33	31	25	49	45	41	39	42	32
	300	142	0.00	0.14	41	35	27	19	18	14	47	41	33	24	26	19	54	47	42	35	32	27	55	51	46	41	44	34
	450	212	0.01	0.34	49	44	34	28	26	20	54	49	38	30	32	24	62	52	47	37	38	29	62	55	51	45	46	34
	600	283	0.01	0.58	56	48	41	35	33	24	58	54	45	36	38	26	65	57	48	42	39	33	65	61	54	48	47	39
7	200	94	0.00	0.03	-	-	-	-	-	-	41	35	27	19	16	-	44	40	34	32	29	21	42	40	39	37	36	31
	400	189	0.00	0.15	41	35	26	19	15	-	47	42	34	25	20	14	52	49	44	37	31	26	54	52	47	42	37	32
	600	283	0.00	0.32	48	42	31	27	21	16	51	47	38	30	24	18	57	55	46	38	34	26	61	57	51	46	38	33
	800	377	0.00	0.56	53	51	40	35	24	22	56	54	43	37	28	24	60	57	52	44	35	29	63	61	55	48	41	38
8	300	142	0.01	0.06	-	-	-	-	-	-	42	37	29	19	18	-	48	47	39	31	28	26	49	48	42	37	36	31
	500	236	0.02	0.16	40	35	24	19	16	-	46	44	34	26	22	16	55	53	45	38	33	28	58	55	47	44	39	35
	750	354	0.04	0.34	47	45	34	29	25	20	53	49	38	33	27	21	58	57	47	41	36	31	63	59	54	47	43	39
	1000	472	0.07	0.59	54	52	42	35	29	26	56	54	44	38	31	29	62	56	52	44	39	33	65	62	56	49	45	39
10	450	212	0.00	0.05	-	-	-	-	-	-	42	41	31	25	19	13	49	48	42	35	28	25	54	51	47	39	35	31
	750	354	0.02	0.14	41	36	25	19	14	-	46	44	35	27	22	15	56	55	47	41	35	28	58	56	50	44	40	35
	1150	542	0.04	0.30	47	45	34	28	25	19	51	49	42	33	27	22	59	57	50	42	37	32	63	62	55	48	44	40
	1500	708	0.07	0.53	54	52	44	36	28	22	56	55	47	39	33	29	62	61	52	45	40	36	67	65	59	51	48	42
12	800	377	0.04	0.10	38	34	24	17	-	-	46	43	34	25	21	12	54	52	46	48	33	25	57	55	49	44	38	34
	1200	566	0.12	0.25	43	39	32	25	21	16	51	47	39	30	25	18	59	57	50	42	39	27	64	59	54	48	43	36
	1600	755	0.18	0.46	52	47	40	31	26	22	54	52	45	34	28	23	62	58	53	44	37	31	65	62	57	48	45	35
	2000	943	0.30	0.68	55	52	45	37	28	22	58	55	47	38	33	26	64	60	55	48	41	35	68	65	57	51	44	39
14	1000	472	0.05	0.09	38	33	21	-	-	-	48	44	36	26	22	16	56	55	48	39	35	29	59	56	51	44	41	36
	1500	708	0.08	0.20	44	39	32	25	22	16	52	48	41	32	26	21	60	57	51	42	38	31	63	62	54	47	45	32
	2250	1061	0.15	0.41	55	49	42	36	28	23	57	56	48	37	32	25	63	61	54	46	39	35	67	65	57	50	47	41
	3000	1415	0.27	0.74	63	56	51	44	37	27	62	61	53	46	39	32	67	65	57	51	46	39	70	66	61	53	47	41
16	1000	472	0.03	0.06	37	-	-	-	-	-	49	41	36	27	22	14	55	51	47	43	39	27	54	51	47	45	42	35
	2000	943	0.14	0.25	53	45	40	34	28	21	55	49	44	35	32	24	66	62	54	47	44	36	68	62	56	51	46	40
	3000	1415	0.28	0.57	64	56	51	45	41	35	64	58	52	46	42	36	70	64	57	51	47	42	70	65	60	52	47	41
	4000	1887	0.51	1.04	70	64	57	52	50	44	71	64	59	52	49	44	75	69	63	55	52	48	70	65	60	53	48	43
18	1250	590	0.03	0.06	37	32	23	21	18	-	49	44	36	27	25	16	60	54	48	44	37	27	61	58	56	51	46	36
	2500	1179	0.15	0.25	54	49	42	34	31	22	57	52	44	36	33	24	67	62	54	46	43	35	72	67	61	53	48	42
	3750	1769	0.31	0.61	63	59	52	44	40	35	64	59	52	45	40	36	69	65	58	49	45	40	72	67	61	54	48	43
	5000	2358	0.55	1.07	72	67	61	54	53	46	70	66	61	56	53	47	74	72	63	56	54	51	72	68	62	53	47	43
20	1750	825	0.02	0.06	37	32	23	21	19	-	49	44	36	26	25	15	61	54	48	44	37	26	62	58	55	50	45	37
	3500	1651	0.08	0.24	53	50	42	32	31	22	57	52	44	36	32	24	68	62	53	47	42	33	71	65	61	53	48	42
	5200	2453	0.21	0.56	63	58	52	45	38	35	65	58	51	44	40	34	67	63	57	49	45	38	71	67	62	54	47	41
	7000	3302	0.36	0.99	70	65	58	51	45	43	70	65	58	51	47	45	72	68	62	53	47	45	73	70	63	56	52	46
24	2500	1179	0.05	0.08	40	34	27	18	17	-	53	47	38	31	28	15	65	56	52	46	42	31	66	60	56	51	45	40
	5000	2358	0.15	0.31	57	51	44	39	35	27	61	55	48	38	37	29	70	66	59	51	46	39	74	67	63	53	48	43
	7000	3302	0.31	0.69	68	63	54	47	44	41	68	64	57	49	45	41	73	69	62	54	48	46	73	71	63	55	50	47
	10000	4717	0.55	1.20	75	71	62	56	51	48	74	71	62	57	50	49	77	73	65	57	51	50	77	73	66	61	54	49

Performance Notes:

1. Radiated sound power is the breakout noise transmitted through the unit casing walls.
2. Sound power levels are in decibels, dB re 10⁻¹² watts.
3. Sound power values less than the sound pressure values of an NC are represented by (-).
4. The total pressure is the sum of the inlet static pressure and the drop in velocity pressure from the inlet to the outlet of the unit.



STD. TYPE OUTLET ARRANGEMENT
TYPE H - SHOWN

A - 1" MIN. GAP TO THE EDGE OF CASING
B - 2" MIN. GAP BETWEEN THE OUTLETS

PRODUCT DESCRIPTION

- Sturdy 22 gauges galvanized steel construction with round/oval outlets.
- Convenient slip and drive connection on inlet.
- Manual locking and balancing damper on each outlet (does not provide complete shut-off)
- Outlet configurations as shown for both standard and extended plenum outlets.
- Optional insulation of 1" thick 24 kg/mt³ density fiberglass material.
- Optional hanger brackets.

STANDARD OUTLET DIMENSIONS (INCHES)

NOMINAL SIZE	ROUND Ø	OVAL SIZE - H X W	NOMINAL SIZE	ROUND Ø	OVAL SIZE - H X W
5	4 7/8	3 7/8 X 5 7/16	14	N/A	7 7/8 X 17 5/16
6	5 7/8	3 7/8 X 7 1/32	16	N/A	7 7/8 X 20 7/16
7	6 7/8	5 7/8 X 7 7/16	18	N/A	7 7/8 X 23 9/16
8	7 7/8	N/A	20	N/A	7 7/8 X 26 3/4
9	N/A	7 7/8 X 9 7/16	22	N/A	7 7/8 X 29 7/8
10	N/A	7 7/8 X 11 1/32	24	N/A	7 7/8 X 33 1/32
12	N/A	7 7/8 X 14 3/16	26	N/A	7 7/8 X 36 3/16

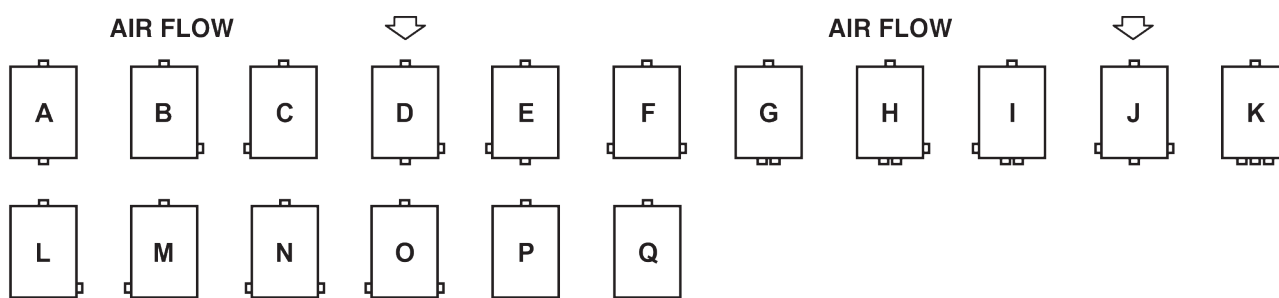
N/A : Not Available Size.

Round Ø: Outlet Diameter.

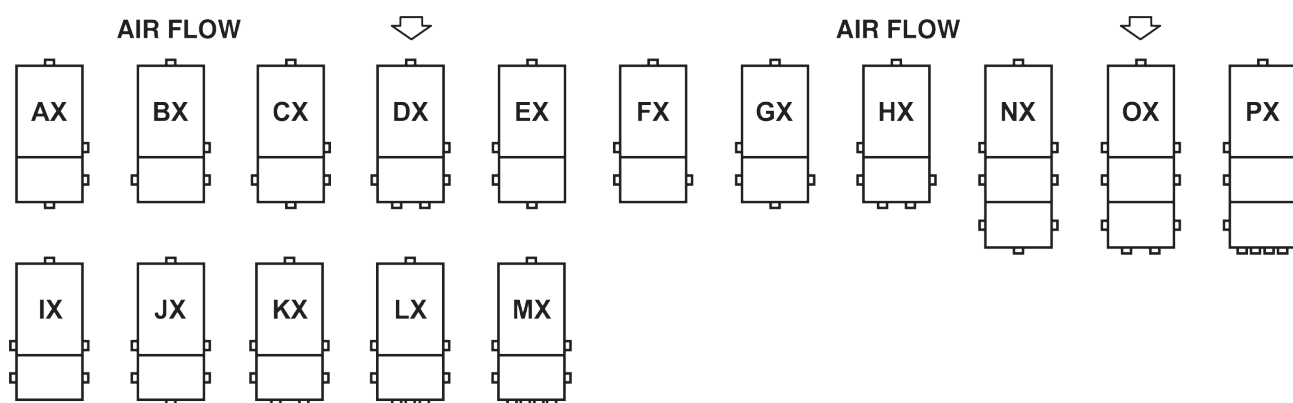
HxW : Height x Width of Oval Collar.

VARIABLE AIR VOLUME CONFIGURATIONS FOR OUTLETS

CONFIGURATIONS FOR STANDARD TYPE OUTLET ARRANGEMENTS (PLAN VIEW)



CONFIGURATIONS FOR EXTENDED TYPE PLENUM OUTLET ARRANGEMENTS (PLAN VIEW)



SELECTION OF CONFIGURATION FOR STANDARD OUTLET ARRANGEMENT / EXTENDED PLENUM (MULTI-DISCHARGE ADAPTOR)

- Select the dimension for required diameter (round collar) or equivalent dimension of oval collar from the standard dimension outlet table.
- Add 2" to the diameter of round outlet or to the width of oval outlet.
- Compute the number of outlets required on one surface by further a gap of 2" in between the collars.
- The result must be less than or equal to the available unit length for side outlets or width for end outlets.
- Available unit length without extended plenum is found by subtracting 12" from standard unit length and available unit width is full unit width.
- Also the outlet diameter of round collar or height of oval collar should be 2" less than the total unit height. If side outlets chosen exceeds the above dimensions allowed then an extended plenum (multi discharge adaptor) is required.
- Extended plenums (multi discharge adaptors) are available from 12" increment to a maximum of 48".
- If unit has optional control panel, side outlets on unit control panel side are not allowed without multi discharge adaptor i.e. extended plenum.

**VARIABLE AIR VOLUME
STANDARD CONSTRUCTION FEATURE
ELECTRIC HEATER**



PRODUCT DESCRIPTION

The GGC Electric Coil is available on single duct terminal units. Electric coils meet all applicable requirements of National Electric Code (NEC) and are UL listed.

Heater frames and boxes are constructed of 20 gauges G.I. Steel. Factory pre-wiring of components eliminates costly field installation. A specified wiring diagram is furnished for every heater

Other Features Include :

- Automatic reset primary thermal cutout.
- Replaceable secondary thermal cutout.
- Low-pressure drop/sound levels.
- Power terminal blocks.
- Control line terminal blocks.
- De-energizing magnetic contactors as required.
- Airflow interlock switch.
- Coils are provided with S and Drive connections on the inlet and flange connection on the discharge.
- 80-20 Nickel-Chromium wire.
- Airflow proving switch with total pressure pick up probe.
- Control transformer in heaters for electric or electronic control options.
- Ground connector for earth.
- Disconnect switch/fusing and mercury contractors as required /optional.

**VARIABLE AIR VOLUME
PERFORMANCE SELECTION DATA
ELECTRIC HEATER**



KW Required to Match Heat Loss	$(Q) \text{ KW} = \frac{Q \text{ (Btu/h)}}{3413}$
Sensible Heat Load	$Q \text{ (Btu/h)} = 1.08 \times \text{CFM} \times \text{Temp. Rise}$
Load Requirement	$\text{KW} = \frac{\text{CFM} \times \text{Air Temperature Rise}}{3160}$
Temperature Rise	$\text{T.R.} = \frac{\text{Kw} \times 3160}{\text{Cubic Feet Per Min.}}$
Ohm's Law	$\text{Watts} = \frac{(\text{Volts})^2}{\text{Resistance}} = \text{Volts} \times \text{Amps}$
Line Current, 1 Phase	$\text{Amps} = \frac{\text{Watts}}{\text{Volts}}$
Line Current, 3 Phase	$\text{Amps} = \frac{\text{Watts}}{1.73 \times \text{Volts}}$
Pressure Drop	$\text{Inches H}_2\text{O} = \frac{\text{KW} / \text{ft.}^2}{760} \times \left(\frac{\text{Velocity in FPM}}{500} \right)^2$
Maximum Discharge Air Temperature	125 ⁰
KW Per Square Foot	$(\text{KW} / \text{Ft.}^2) = \text{KW} \div \frac{\text{Duct Width (in)} \times \text{Duct Height (in)}}{144}$

Note : Maximum heater discharge temperature should not exceed 125⁰ F to avoid nuisance tripping.

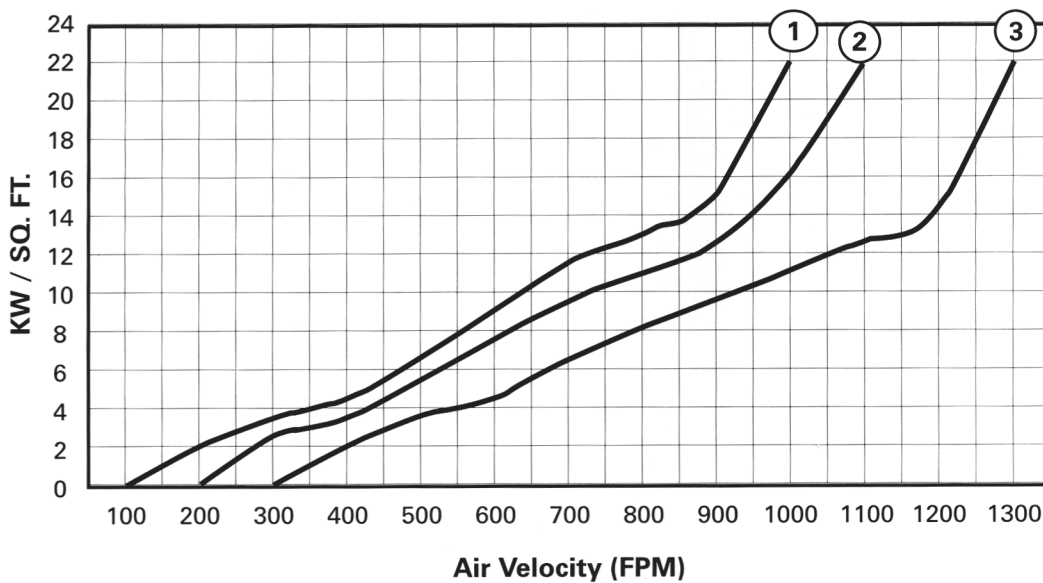
VARIABLE AIR VOLUME ELECTRIC COIL PERFORMANCE DATA ELECTRIC HEATER

Since an electric duct heater has a constant BTU output as long as the heater is energized, a minimum air velocity must be maintained through the heater. Proper airflow will prevent over-temperature causing nuisance tripping and will maintain element life expectancy. The velocity of airflow in the duct is determined by the formula:

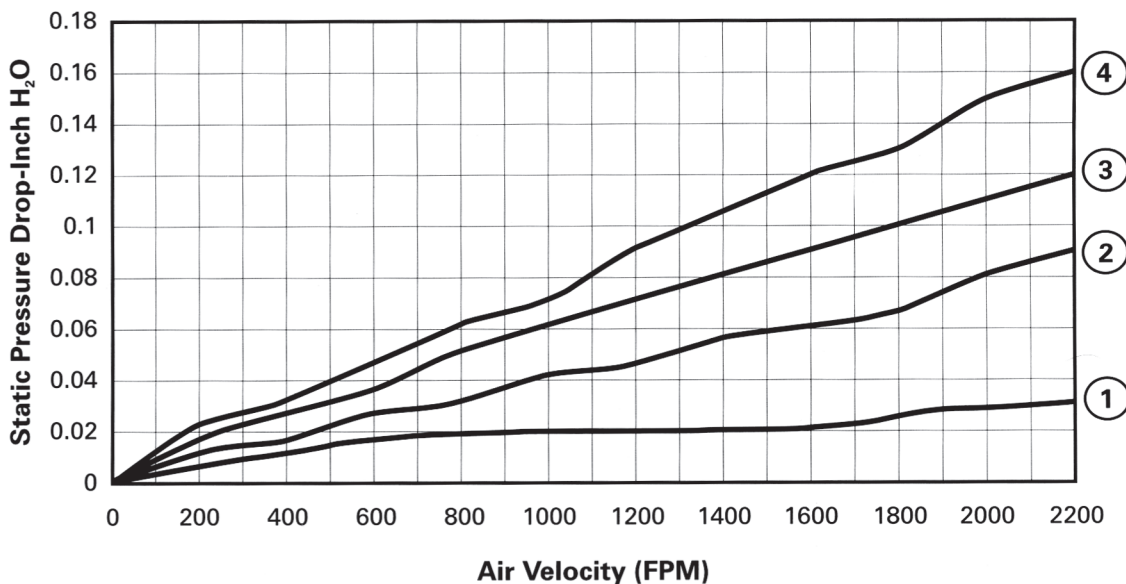
$$\text{VELOCITY} = \frac{\text{CFM}}{\text{DUCT AREA (Ft.}^2\text{)}}$$

And has to be compared with the minimum airflow velocity through the electric heater based on discharge duct area (Ft.²). The minimum uniform airflow in a duct heater is directly related to the inlet air temperature and consideration must be given to both the airflow across the heater and the inlet air temperature.

Divide the total watts by square footage of duct area to calculate the watts per sq. foot of that duct area. Use the chart to determine the minimum FPM based on inlet entering air temperature.



1 - Below 70°F inlet air 2 - 70°F to 90°F inlet air 3 - 91°F to 110°F inlet air



1,2,3 and 4 are the number of rows for heater coils

VARIABLE AIR VOLUME WITH HEATER

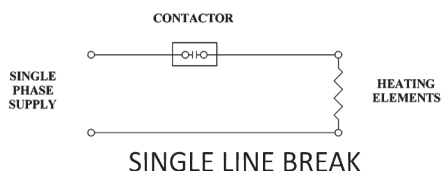
TECHNICAL DATA

TYPICAL CONTRACTOR POWER CIRCUITRY

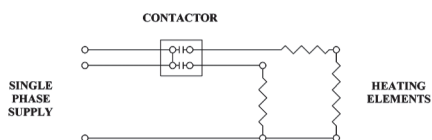
(Only power circuite shown, Safety devices etc., omitted)

DE - ENERGIZING CONTRACTOR TYPE:

SINGLE PHASE

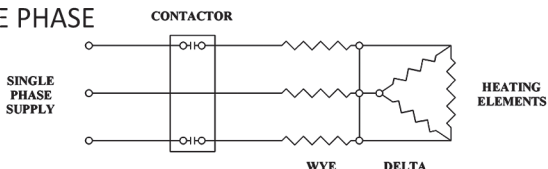


Heater is de-energized by breaking only one side of the line trough the action of the single contact. This type will be disconnecting for 120V and 277V, provided the contractor opens the under grounded line.



The above illustrates using a two pole contractor to de-energize one side of the line. This type of circuitry doubles the contractor capacity. This type would be disconnecting on 120V and 277V.

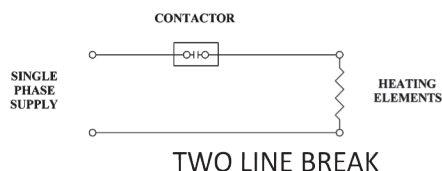
THREE PHASE



Illustrates a two line break which will de-energize the heater. Both WYE and Delta heating elements configuration is shown.

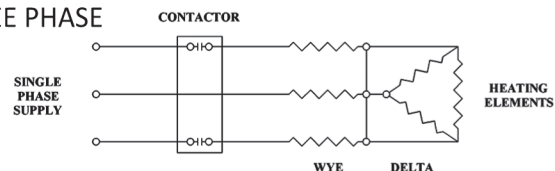
DISCONNECTING TYPE:

SINGLE PHASE



Heating power is completely disconnected by breaking both sides of the power source. All ungrounded power conductors are disconnected.

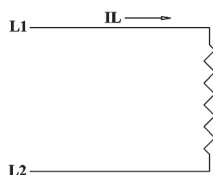
THREE PHASE



All grounded conductors disconnected. Both WYE and Delta Configurations are shown.

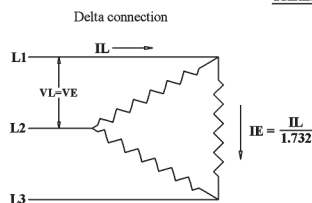
HEATER ELEMENTS WIRING CONFIGURATION AND PROPERTIES

SINGLE PHASE



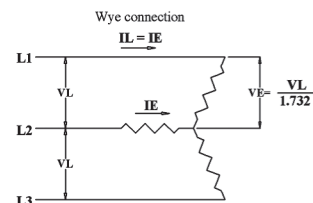
Element Voltage = Line Voltage
 P = Power in watts.
 IE = Current in Amps.
 VE = Element Voltage in Volts.
 IL = Line Current in Amps.
 VL = Line Voltage in Volts.

THREE PHASE



THREE WIRE "DELTA" CONNECTION

1. Element Voltage = Line Voltage
2. Phase Current $I_n = I_{L1} = I_{L2} = I_{L3}$
3. Voltage measured between any two power legs (L1 to L2 etc.) should be equal to the three phase line voltage.



THREE WIRE "WYE" CONNECTION

1. Element voltage = $\frac{\text{line Voltage}}{1.73}$
2. Phase Current $I_n = I_{L1} = I_{L2} = I_{L3}$
3. Voltage measured between any two power legs (L1 to L2 etc.) should be equal to the three phase voltage.

VARIABLE AIR VOLUME BTU/H-KW-AMPERES CHART

SL. NO.	BTU/HR	KW	AMPHERES				KW	BTU/HR
			220 VOLTS		380 VOLTS			
			1 Ø	3 Ø	1 Ø	3 Ø		
01	3413	1	4.5	2.6	2.6	1.52	1	3413
02	6826	2	9.1	5.3	5.26	3.04	2	6826
03	10239	3	13.6	7.9	7.89	4.56	3	10239
04	13652	4	18.2	10.5	10.52	6.08	4	13652
05	17065	5	22.7	13.1	13.15	7.6	5	17065
06	20478	6	27.3	15.8	15.78	9.13	6	20478
07	23891	7	31.8	18.4	18.42	10.65	7	23891
08	27304	8	36.4	21	21.05	12.17	8	27304
09	30717	9	40.9	23.6	23.68	13.69	9	30717
10	34130	10	45.5	26.3	26.31	15.21	10	34130
11	37543	11	50	28.9	28.94	16.73	11	37543
12	40956	12	54.5	31.5	31.58	18.25	12	40956
13	44369	13	59.1	34.2	34.21	19.77	13	44369
14	47782	14	63.6	36.8	36.84	21.29	14	47782
15	51195	15	68.2	39.4	39.47	22.81	15	51195
16	54608	16	72.7	42.0	42.1	24.33	16	54608
17	58021	17	77.3	44.7	44.73	25.85	17	58021
18	61434	18	81.8	47.3	47.37	27.38	18	61434
19	64847	19	86.4	49.9	50.0	28.9	19	64847
20	68260	20	90.9	52.5	52.63	30.42	20	68260

FORMULA FOR CALCULATING LINE CURRENTS

SINGLE PHASE

$$\text{AMPHERES} = \frac{\text{WATTS}}{\text{LINE VOLTAGE}}$$

THREE PHASE

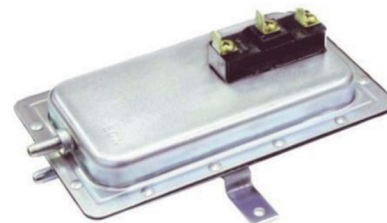
$$\text{AMPHERES} = \frac{\text{WATTS}}{\text{LINE VOLTAGE} \times 1.73}$$

TO CONVERT "KW" TO WATTS
MULTIPLY "KW" BY 1,000

VAV & VAV WITH HEATER ACCESSORIES

AIR FLOW SWITCH

An airflow switch of the pressure type shown right is the best and most positive method of protection against loss of air flow. The switch has a built-in diaphragm that senses the pressure differences from the inside to the outside of the duct. It's adjustable pressure range is from 0.05 ± 0.2 wg" to 13.8"wg.



MAGNETIC CONTACTORS

Magnetic contactors are standard in all heaters. They are used for primary back-up control. Two and three pole contactors are available with coil (control voltage) of 24,120,208,240,277 volts.

Full line break: this refers to a contactor that disconnects all ungrounded conductors when the contactor is open. To assure that all lines break, a three pole contactor is required for three phase and a two pole contactor for single phase



POWER FUSING

UL standards and NEC code required for heaters drawing more than 48 AMPS. Accessory fusing is available on heaters drawing less than 48 AMPS when requested.

UL and NEC require that heaters exceeding a total of 48 AMPS, be subdivided into circuits not exceeding 48 Amps each. Therefore, if the heater exceeds 48 AMPS, circuit fusing is required built in and furnished by the heater manufacturer.



DISCONNECT SWITCH

Available with door interlock disconnecting switch as an option. The picture in the right shows a disconnecting switch. We can furnish either door interlocking or non-door interlocking and fused or non-fused disconnecting switches. For door interlocking type disconnect switches the handle is mounted on the outside of the hinged panel door and indicates an ON or OFF position.



TERMINAL BLOCK

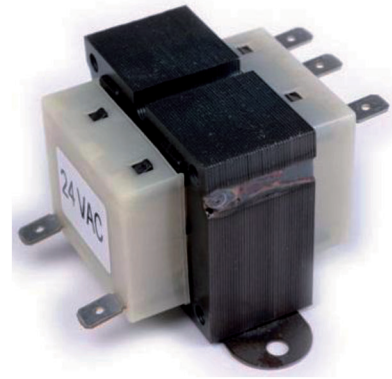
A device that join wires or cable. Terminal block, typically snap into a metal rail or are screw mounted on the panel of a control enclosure.



VAV & VAV WITH HEATER ACCESSORIES

TRANSFORMERS

Transformers are required when a control voltage source is not available and the line volt diffusers from the control unit. Normally, transformers are furnished together with the other heater accessories as an integral part of the VAV with heater. Primary, or line voltages, of 120,208,240,277 or 480 are available with secondary of 24 V.



AUTOMATIC AND MANUAL RESET THERMAL CUT OFF SWITCH

The primary automatic reset thermal cut off switch disconnect the heater from the main circuit once the temperature limit is reached. The secondary manual thermal cut off switch comes into action if primary cut off switch fails. The cut off switch enhance the safety of the heater in addition to the air flow switch.



RDU 340(Room Temperature Controller)

- Modulating PI control
- Control depending on the room or the return air temperature
- Output for a DC 0...10 V actuator and AC 230 V electric heater(ON-OFF0
- Automatic or manual heating/cooling changeover
- Operating modes; Comfort, Energy saving and Protection
- Two multifunctional inputs for keycard contact, external sensor etc
- Adjustable commissioning and control parameters
- Minimum and maximum set point limitation
- Adjustable minimum and maximum limitation for air flow signal DC 0...10V
- Output signal inversion as an option
- Mounting on recessed rectangular conduit box, 60.3 mm fixing centers
- AC 24 V operating voltage
- Application selectable
- Single-duct system
- Single-duct system with electrical heater



VAV & VAV WITH HEATER ACCESSORIES

GDB181.1E/3&GLB181.1E/3(Pressure independent actuator)

- Integrated static, position-independent pressure sensor for 300Pa.
- Supply air/ extract air control with master slave configuration
- For indoor use
- For mounting on VAV ducts
- Recommended for damper shaft dia 8...16 mm, square 6...12 mm
- With position indicator and mechanically adjustable end stop
- Gear train disengagement button for manual adjustment
- With base plate made of steel , plastic housing and 0.9 m connecting cable

Attribute	Value
Operating voltage	AC 24 V
Frequency	50/60 Hz
Power consumption	6 VA
Positioning signal	3-position, DC 000010 V
Positioning time	150 S
Angular rotation	90°
Air damper area	0.80 m ² /1.5 m ²
Torque	5.00 Nm/10.00 Nm
Degree of protection	IP54
Dimensions(WxHxD)	68x137x59.5 mm

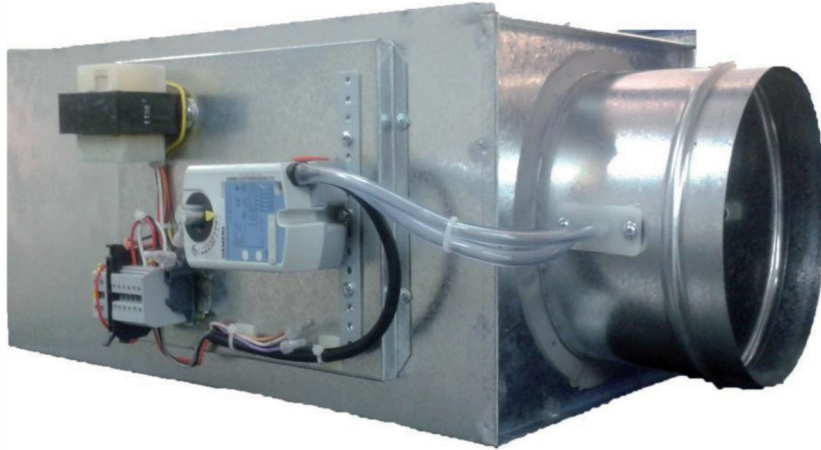


GDB 161.1E /GLB161.1E(Pressure dependent actuator)

- For shaft dia 8...16 mm, square 6 ...12 mm, min.shaft length 30 mm
- With position indication and adjustable mechanical limit stop
- Button for disengaging the gear train to enable manual override
- With base made of steel ,plastic housing and 0.9 m connecting cable

Attribute	Value
Torque	5.00 Nm/10.00 Nm
Air damper Area	0.80 m ² /1.5 m ²
Angular rotation	90°
Positioning time	150 s
Degree of protection	IP54
Dimensions(WxHxD)	68x137x59.5 mm
Operating Voltage	AC 24 V
Power Consumption	3 VA
Positioning signal	DC 0-10 V
Rated Output	3.00 VA
Auxiliary switch	0
Cable length	0.90 m





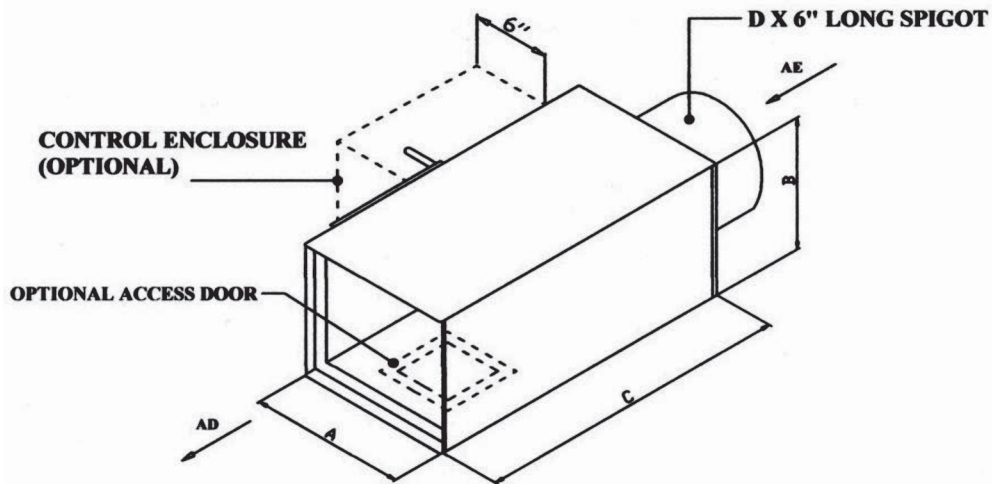
Pressure independent type CAVs combine the advantages of proven air handling concepts to give complete zoning flexibility at a medium cost from a single zone source

These CAV's deliver constant air volume as set by the program, by providing excellent performance and temperature control for central air distribution systems with unlimited zoning capacity, by supplying constant air volumes to individual zones. The added advantage of multi-zone systems is by supplying centralized air distribution from unwanted zones to demand related zones.

Easy and simple to install, can be used with packaged/ducted. Air handling units in any buildings or offices and can be easily modified or relocated as interior requirements

The multi point averaging sensor located at the inlet collar of the CAV, direct the pressure data to the built in differential pressure sensor in the controller.

The built in differential pressure sensor in the controller sensitive to even the minute variation in the inlet pressure reposition the damper to adjust for the variation and continue to deliver constant air volume to the room irrespective of the change in inlet pressure. The ability of the controller to maintain its constant supply of air in varying inlet flow and static pressure conditions, representing a pressure independent operation.



PRODUCT DESCRIPTION:

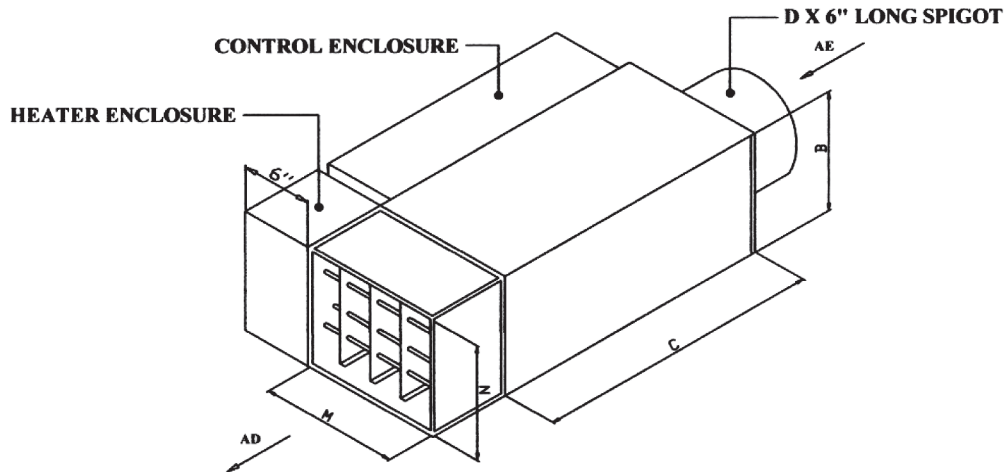
- All standard outlet connections are rectangular and require a slip and drive duct connection for installation
- The damper blade and control shaft (3/8"-0) are extruded aluminum mechanically keyed together as a single piece
- Blade operation by maintenance free nylon bearings for smooth and noiseless operation
- 22 gauge zinc coated mill galvanized steel casing construction, providing strength and product durability
- 1" thick 24 kg/m³ fiberglass insulation with black facing which acts as acoustic attenuator and thermal resistant barrier.
- Multi-point averaging type flow sensor for pressure independent applications.

DIMENSIONS LISTED IN INCHES – BASIC ASSEMBLY						
MODEL	CFM	DISCHARGE		LENGTH	COLLAR	EQUIVALENT
	RANGE	A	B	C	DIA - Ø - D	OVAL SIZE - O
CAD90-02E	90 – 400	10	10	24	5	N/A
CAD90-04E	130 – 600	10	10	24	6	N/A
CAD90-06E	175 – 800	12	10	24	7	N/A
CAD90-08E	200 – 1000	12	10	24	8	N/A
CAD90-10E	310 – 1500	14	10	24	10*	7 7/8" X 09 7/16
CAD90-12E	410 – 2000	16	10	24	12*	7 7/8" X 11 3/16
CAD90-14E	610 – 3000	22	10	24	14*	7 7/8" X 14 3/16
CAD90-16E	810 – 4000	28	10	24	16*	7 7/8" X 17 5/16
CAD90-18E	1000 – 5000	36	10	24	18*	7 7/8" X 20 7/16
CAD90-20E	1400 – 7000	28	18	24	20*	15 7/8" X 22 5/32
CAD90-22E	1950 - 10000	36	18	24	24*	15 7/8" X 28 5/32

AE: Air Flow Enter, **AD:** Air Flow Discharge.

*Provided with flat oval collar. All other collars are round.

Oval Size- O: H X W – Height X Width of oval collar. **N/A:** Not Available.



PRODUCT DESCRIPTION

- All standard outlet connections are rectangular and require a slip and drive connection for installation
- The damper blade and control shaft (3/4"-0) are extruded aluminum mechanically keyed together as a single piece.
- Blade operation by maintenance free nylon bearings for smooth and noiseless operation.
- 22 gauge zinc coated mill galvanized steel casing construction, providing strength and product durability
- 1" thick 24 kg/m³ fiberglass insulation with black facing which acts as acoustic attenuator and thermal resistant barrier
- Multi-point averaging type flow sensor for pressure independent applications

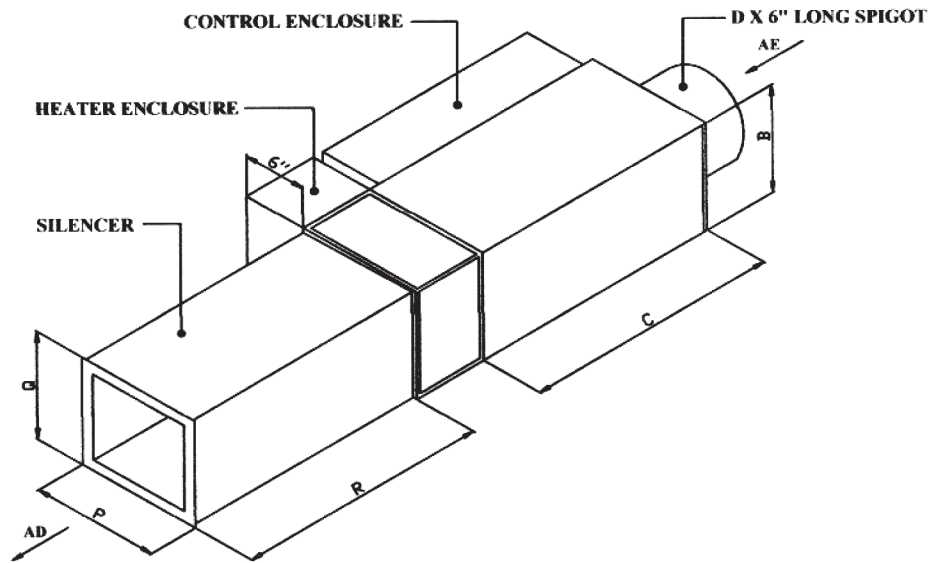
DIMENSIONS LISTED IN INCHES – BASIC ASSEMBLY

MODEL	CFM	DISCHARGE		LENGTH	COLLAR	EQUIVALENT	HEATING COIL
	RANGE	A	B	C	DIA - Ø - D	OVAL SIZE - O	M X N
CAD90-02EH	90 – 400	10	10	24	5	N/A	8 X 8
CAD90-04EH	130 – 600	10	10	24	6	N/A	8 X 8
CAD90-06EH	175 – 800	12	10	24	7	N/A	10 X 8
CAD90-08EH	200 – 1000	12	10	24	8	N/A	10 X 8
CAD90-10EH	310 – 1500	14	10	24	10*	7 7/8" X 09 7/16	12 X 8
CAD90-12EH	410 – 2000	16	10	24	12*	7 7/8" X 11 3/16	14 X 8
CAD90-14EH	610 – 3000	22	10	24	14*	7 7/8" X 14 3/16	20 X 8
CAD90-16EH	810 – 4000	28	10	24	16*	7 7/8" X 17 5/16	26 X 8
CAD90-18EH	1000 – 5000	36	10	24	18*	7 7/8" X 20 7/16	34 X 8
CAD90-20EH	1400 – 7000	28	18	24	20*	15 7/8" X 22 5/32	26 X 16
CAD90-22EH	1950 - 10000	36	18	24	24*	15 7/8" X 28 5/32	34 X 16

AE: Air Flow Enter, **AD:** Air Flow Discharge.

*Provided with flat oval collar. All other collars are round.

Oval Size- O: H X W – Height X Width of oval collar. **N/A:** Not Available.



PRODUCT DESCRIPTION

- 22 zinc coated mill galvanized steel casing construction, providing strength and product durability
- 1" thick 24 kg/m³ fiberglass insulation with black facing which acts as acoustic attenuator and thermal resistant barrier
- Multi-point averaging type flow sensor for pressure independent application
- All standard outlet connections are rectangular and require a slip and drive duct connection for installation
- The damper blade and control shaft (3/8"-0) are extruded aluminum mechanically keyed together as a single piece
- Blade operation by maintenance free nylon bearings for smooth and noiseless operation

DIMENSIONS LISTED IN INCHES – BASIC ASSEMBLY

MODEL	CFM	DISCHARGE		LENGTH	COLLAR	EQUIVALENT	SILENCER SIZE		
	RANGE	A	B	C	DIA - Ø - D	OVAL SIZE - O	P	Q	R
CAD90-02EHS	90 – 400	10	10	24	5	N/A	8	8	24
CAD90-04EHS	130 – 600	10	10	24	6	N/A	8	8	24
CAD90-06EHS	175 – 800	12	10	24	7	N/A	10	8	24
CAD90-08EHS	200 – 1000	12	10	24	8	N/A	10	8	24
CAD90-10EHS	310 – 1500	14	10	24	10*	7 7/8" X 09 7/16	12	8	24
CAD90-12EHS	410 – 2000	16	10	24	12*	7 7/8" X 11 3/16	14	8	24
CAD90-14EHS	610 – 3000	22	10	24	14*	7 7/8" X 14 3/16	20	8	24
CAD90-16EHS	810 – 4000	28	10	24	16*	7 7/8" X 17 5/16	26	8	24
CAD90-18EHS	1000 – 5000	36	10	24	18*	7 7/8" X 20 7/16	34	8	24
CAD90-20EHS	1400 – 7000	28	18	24	20*	15 7/8" X 22 5/32	26	16	24
CAD90-22EHS	1950 - 10000	36	18	24	24*	15 7/8" X 28 5/32	34	16	24

AE: Air Flow Enter, **AD:** Air Flow Discharge.

*Provided with flat oval collar. All other collars are round.

Oval Size- O: H X W – Height X Width of oval collar. **N/A:** Not Available.