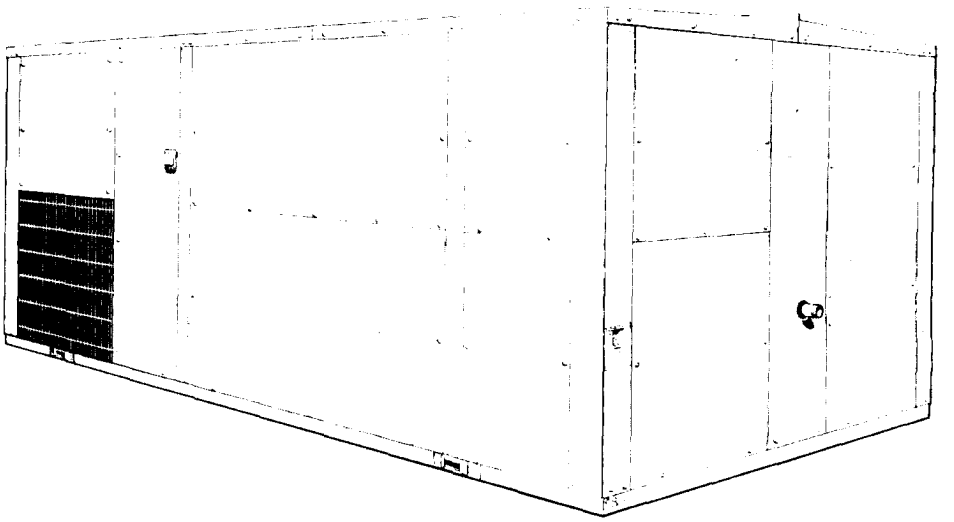
YORK®

SUNLINE SERIES
SINGLE PACKAGE AIR CONDITIONERS

INSTALLATION INSTRUCTION | Supersedes: 530.25-N2Y (488) | Tab DSV | 530.25-N2Y (1189)

035-08597

MODELS D1SV/D2SV300, 360 & 480



GENERAL

This instruction covers the installation, start-up and operation of these air conditioning units. If the unit includes a heating option, use this instruction in conjunction with the proper heating instruction.

Gas Heat Option	Form 530.25-N1.1
Electric Heat Option	Form 530.25-N1.9

These units are completely packaged, factory charged, cooling only or cooling/heating air conditioners, primarily designed for rooftop installation.

See Figure 1 for the internal arrangement of the unit components. These units have semi-hermetic compressors with blocked suction unloading for efficient full and part load operation and can be equipped with an economizer option to provide cooling with outdoor air when the temperatures and the humidity of the outdoor air permit. The unit can also be equipped with exhaust air fans for use in conjunction with the economizer option.

All electrical controls are located on one side of the unit and are readily accessible for maintenance, adjustment and service. All wiring (power and control) and piping can be made thru the bottom or the side of the unit.

Units are available with bottom duct connections for roof mounted installations or may be field converted for end duct connections. Refer to Form 530.25-N1.5.

INSPECTION

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing. Refer to Form 50.15-NM for additional information.

REFERENCE

Additional information on the design, installation, operation and service of refrigeration equipment is available in the reference material listed below.

Form 55.70-N1	General Installation
Form 55.70-N2	Pre-start & Post-start Check List

Renewal Parts: Refer to Parts Microfiche or Parts Manual for complete listing of replacement parts on this equipment.

All forms referenced in this instruction may be ordered from:

Publications Distribution Center
Central Environmental Systems
P.O. Box 1592, York, PA 17405

Installer should pay particular attention to the words: *NOTE*, *CAUTION* and *WARNING*. Notes are intended to clarify or make the installation easier. Cautions are given to prevent equipment damage. Warnings are given to alert the installer that personal injury and/or equipment damage may result if the installation procedure is not handled properly.

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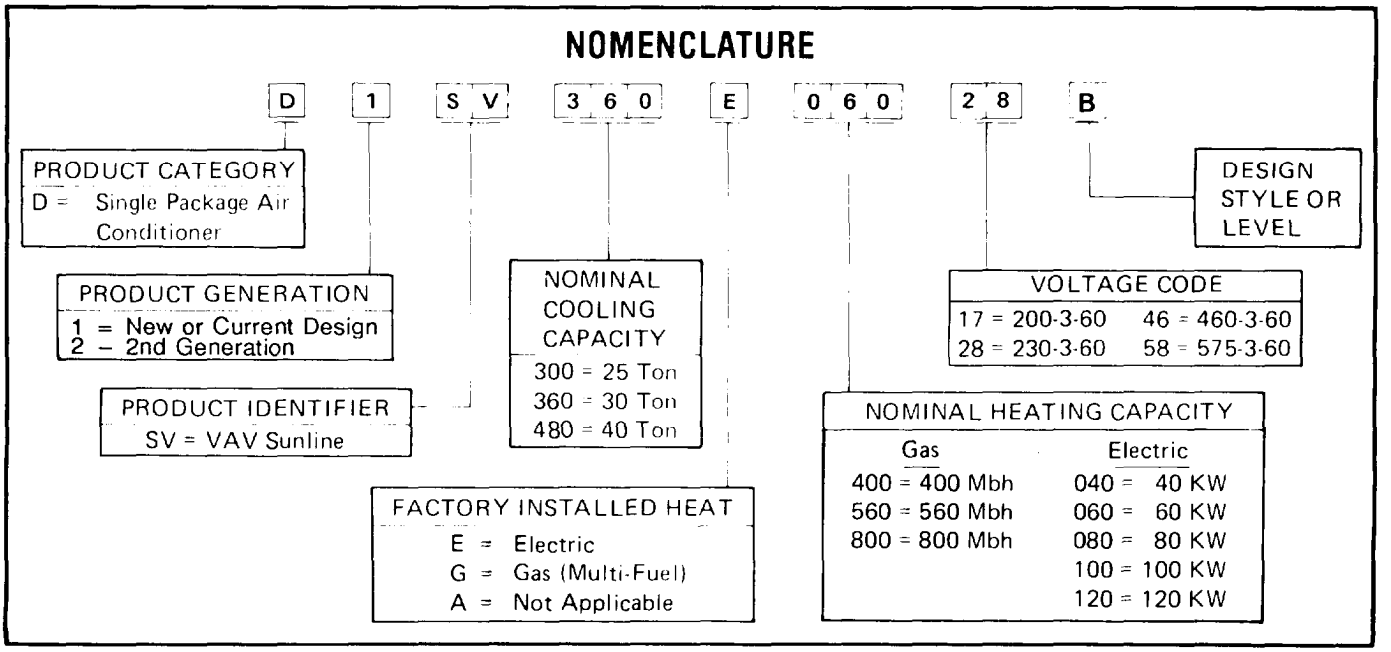
NOMENCLATURE



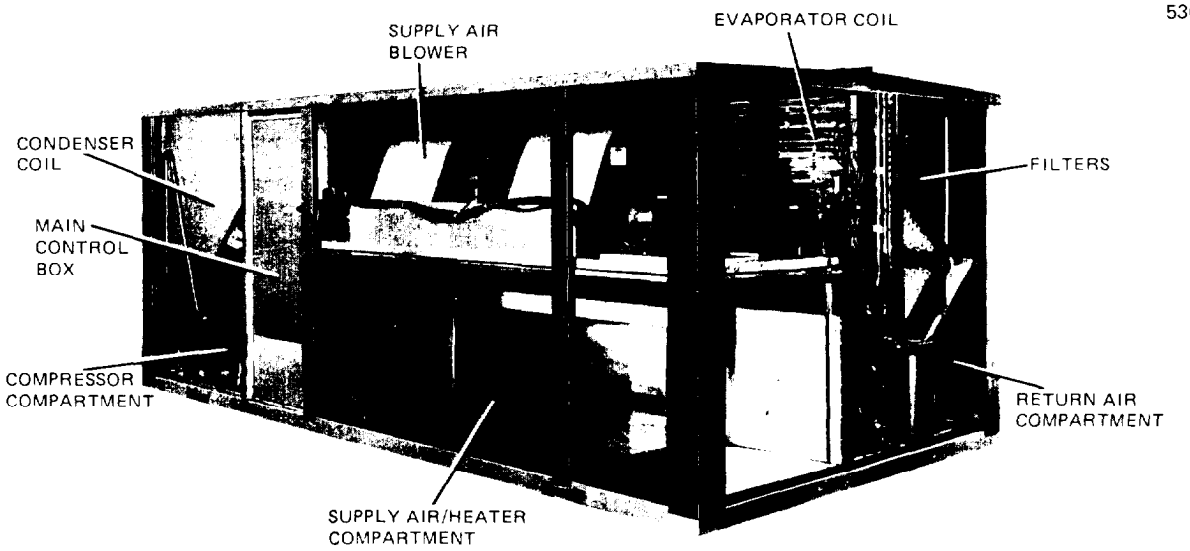


FIG. 1 – UNIT LESS PANELS (DSV 480 SHOWN)

INSTALLATION

LIMITATIONS

These units must be installed in accordance with all national and local safety codes. If no local codes apply, installation must conform with the appropriate national codes. See Table 1 for application data. Units are designed to meet National Safety Code Standards. If components must be added to a unit to meet local codes, they are to be installed at the dealer's and/or the customer's expense.

RIGGING

Sunline units are equipped with lifting lugs on the unit base. Units should be lifted by placing rigging hooks thru the lugs provided. Spreader bars should be used. See Fig. 2.

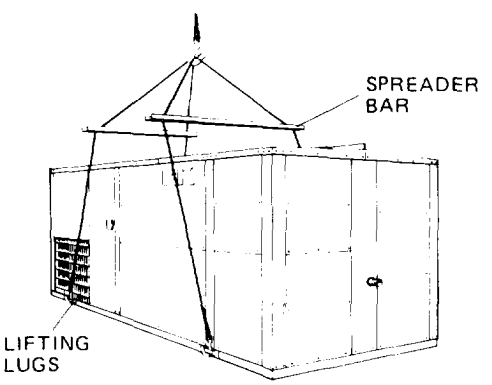


FIG. 2 – TYPICAL UNIT RIGGING

MOUNTING

The structure on which the unit or roof curb is mounted must be capable of supporting the total weight of the unit. Refer to Table 2 for individual component weights. Refer to Figure 3 for approximate centers of gravity.

A roof mounting curb accessory is available to simplify the installation of a Sunline unit. Refer to Form 530.25-N1.6 for installation instructions for assembling and mounting the curb and for installing the unit on the curb. Roof mounting curbs capable of supporting the unit's weight may also be field fabricated.

CLEARANCES

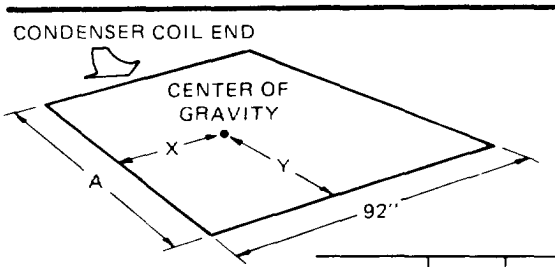
These units must be installed with the minimum clearances listed below.

Front (Control Box Side)	36" for Service Access to Controls
Left side (Condenser coil)	36" for Proper Condenser Air Flow
Rear	36" From Rain Hoods
Right side	36" Units with Electric Heat Option 36" Cooling Only Units
Below unit*	0"
Above unit	120" for Condenser Air Discharge

*Units with an electric heating option can be installed on a combustible floor.

A 2" clearance within 3 feet of the unit must be maintained between any combustible material and the supply air duct work.

No objects should be left near the combustion air inlet to obstruct the openings. If the unit is slab mounted, shrubs and other growth should be eliminated.



MODEL	A	X	Y
DSV300	141	47	77
DSV360	164	48	84
DSV480	184	45	104

FIG. 3 – CENTER OF GRAVITY

TABLE 1 —APPLICATION DATA

MODEL D1SV/D2SV		300	360	480
Voltage Variation, Min/Max[1]	200 Volts	180/220		
	230 Volts	207/253		
	460 Volts	414/506		
	575 Volts	520/635		
Supply Air CFM, Min[2]/Max		3,000/12,000	3,600/14,400	4,800/19,200
Wet Bulb Temp. (°F) of Air on Evaporator Coil, Min/Max		57/72		
Dry Bulb Temp. (°F) of Air on Condenser Coil, Min/Max		35/115		
Maximum Dry Bulb Temp. (°F) of Air Off:	Electric Heater	180	180	180

[1] Utilization Range "A" in accordance with ARI Standard 110.
[2] Hot gas bypass will be required if the CFM drops below the minimum values shown.

TABLE 2 — COMPONENT WEIGHTS (LBS.)

MODEL	DSV		
	300	360	480
BASIC UNIT*	**3135**	**3675**	**4480**
Options			
Economizer	220	220	247
Supply Air Motor & Drive			
7-1/2 HP	130	–	–
10 HP	145	145	–
15 HP	–	185	185
20 HP	–	–	215
Heating			
Natural Gas Heat			
G400	140	140	–
G560	240	240	240
G800	–	–	340
Electric Heat			
E040	50	50	50
E060	55	55	55
E080	60	60	60
E100	65	65	65
E120	–	70	70
Exhaust Fan	160	160	250
Discharge Dampers & Actuator (DSV units only)	125	125	150
Accessories			
Roof Mounting Curb	300	350	400
End Outlet Kit	105	105	130

*with fixed outdoor air option

CONDENSATE DRAIN CONNECTION

The condensate drain, located on the right end of the unit, should be connected to an open drain or allowed to discharge directly onto the ground or roof. A trap MUST be installed. See Figure 4.

The 3" dimension must equal or exceed the negative static pressure developed by the supply air blowers. If it doesn't, the condensate will not drain properly and will overflow the drain pan.

The trap must be at least 2" deep to maintain a water seal under all operating conditions, especially when the blowers are starting up.

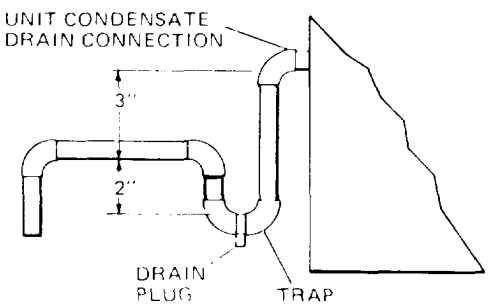


FIG. 4 — RECOMMENDED DRAIN PIPING

POWER AND CONTROL WIRING

Install electrical wiring in accordance with the latest National Electrical Code (NFPA Standard No. 70) and for local regulations. The unit should be grounded in accordance with these codes.

POWER WIRING

The field power wiring can be brought into the control box through the 4-1/2" diameter sleeve in the base of the unit (Figure 5) or through the 3" threaded conduit connector in the side of the control box (Figure 6). The unit is equipped with a conduit termination plate above the 4-1/2" diameter sleeve. The plate has 1-2 3/32", 2-1 2", and 3-5/8" diameter concentric knockouts. For units with disconnect switch, the power lugs can be rotated 90 degrees clockwise to facilitate entrance of the power wiring from the side of the box. To do this remove the 1/4" bolt holding the power lug. Next remove the slotted spring pin which keeps the lug from rotating. Turn the power lug 90 degrees clockwise and replace both the slotted spring pin and the 1/4" bolt.

A non-fused disconnect switch is available as a factory-mounted option on all units. When this option is not included, a field-supplied disconnect switch should be installed in the power supply wiring at a location that will meet the requirements of the National Electric Code and/or local regulations.

NOTE: Fused disconnect switches are not required because the power wiring must be fused at the source.

Either inverse time circuit breaker or dual element time delay fuses may be used for overcurrent protection on these units. They must be sized according to Table 3.

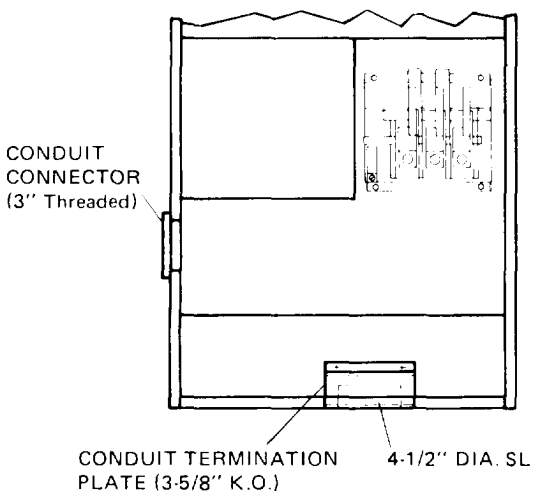
Bottom entry is recommended for:

1. Curb mounted units with a factory installed disconnect switch unless the power wiring is already above the finished roof.
2. Units that are mounted on structural steel above the finished roof unless the steel is blocking the 4-1/2 inch diameter sleeve in the base of the unit. This applies to units with or without a factory installed disconnect switch.

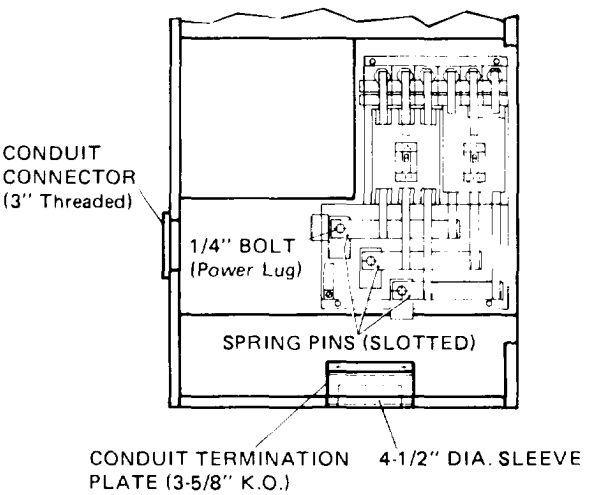
CAUTION: The 4-1/2 inch sleeve must be sealed after the power wiring has been routed to prevent possible condensation problems in the unit control box.

Side entry is recommended for:

1. Curb mounted units without a factory installed disconnect switch because the power wiring must be brought outside the unit to a field supplied disconnect switch.
2. Slab mounted units with or without a factory installed disconnect switch.

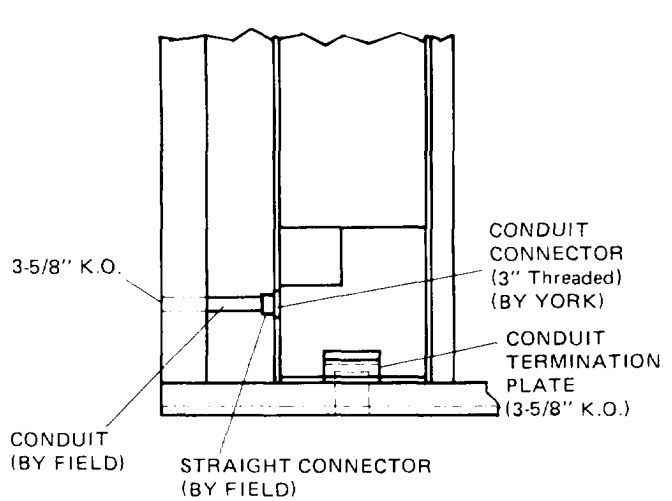


UNITS WITHOUT DISCONNECT

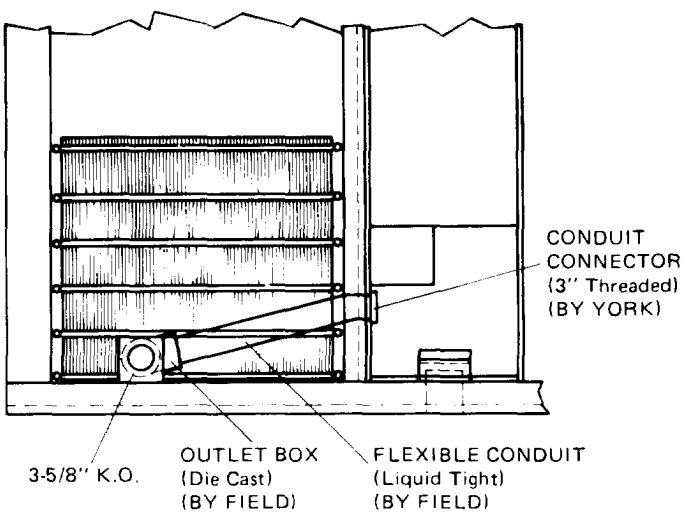


UNITS WITH DISCONNECT

FIG. 5 — BOTTOM POWER WIRING ENTRANCE



MODELS DSV300, 360



MODEL DSV480

FIG. 6 — SIDE POWER WIRING ENTRANCE

CONTROL WIRING (MODELS DSV300, 360)

For bottom entry (Figure 7), the control wiring should be routed:

1. Up through the flexible conduit and the middle deck to the proximity of the hole into the control box.
2. Through the 1-3/8 snap bushing in the condenser evaporator partition and control box.
3. Through the 2 ty-wraps positioned in the control box.
4. Connect the wires to the terminal block per Fig. 9.

For side entry on slab mounted units, the control wiring should be routed:

1. Through the 1-1/8 inch K.O. in the corner post.
2. Through the 1-3/8 snap bushing in the condenser evaporator partition and control box.
3. Through the 2 ty-wraps positioned in the control box.
4. Connect the wires to the terminal block per Fig. 9.

CAUTION: Wiring penetration through the side entry must be sealed to prevent the entrance of water.

CONTROL WIRING (MODEL DSV480)

For bottom entry (Figure 8), the control wiring should be routed:

1. Up through the 2-1/4 inch O.D. tubing behind the control box.
2. Through the positioned ty-wrap on the outside of the control box.
3. Through the 1-3/8 snap bushing in the control box.
4. Through the 2 ty-wraps positioned in the control box.
5. Connect the wiring to the terminal block per Fig. 9.

For side entry on slab mounted units, the control wiring should be routed:

1. Through the 1-1/8 inch K.O. in the intermediate post.
2. Through the 1-3/8 snap bushing in the control box.
3. Through the 2 ty-wraps positioned in the control box.
4. Connect the wiring to the terminal block per Fig. 9.

CAUTION: Wiring penetration through the side entry must be sealed to prevent the entrance of water.

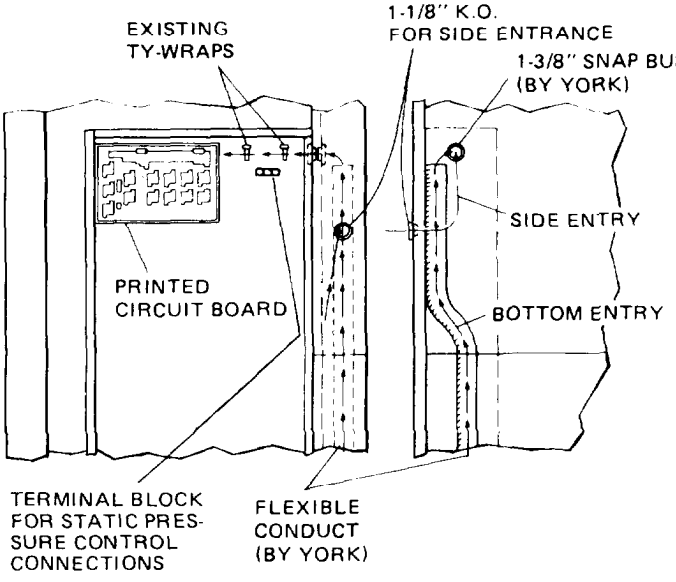


FIG. 7 – CONTROL WIRING ENTRANCE (DSV300, 360)

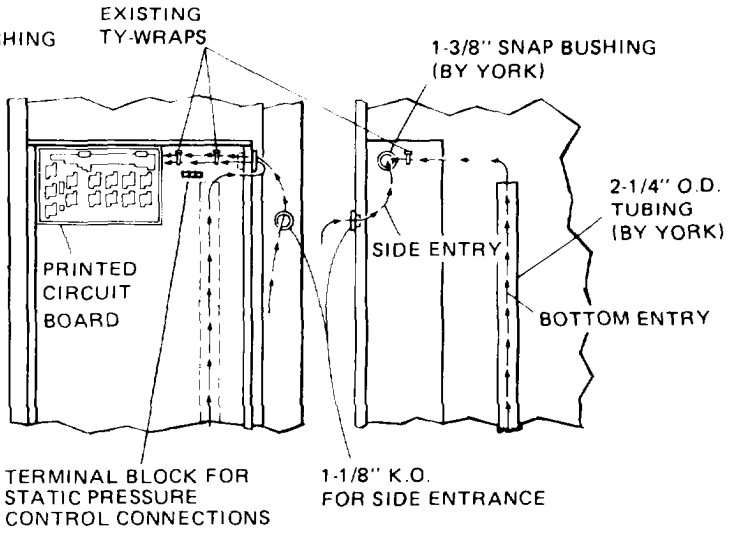


FIG. 8 – CONTROL WIRING ENTRANCE (DSV480)

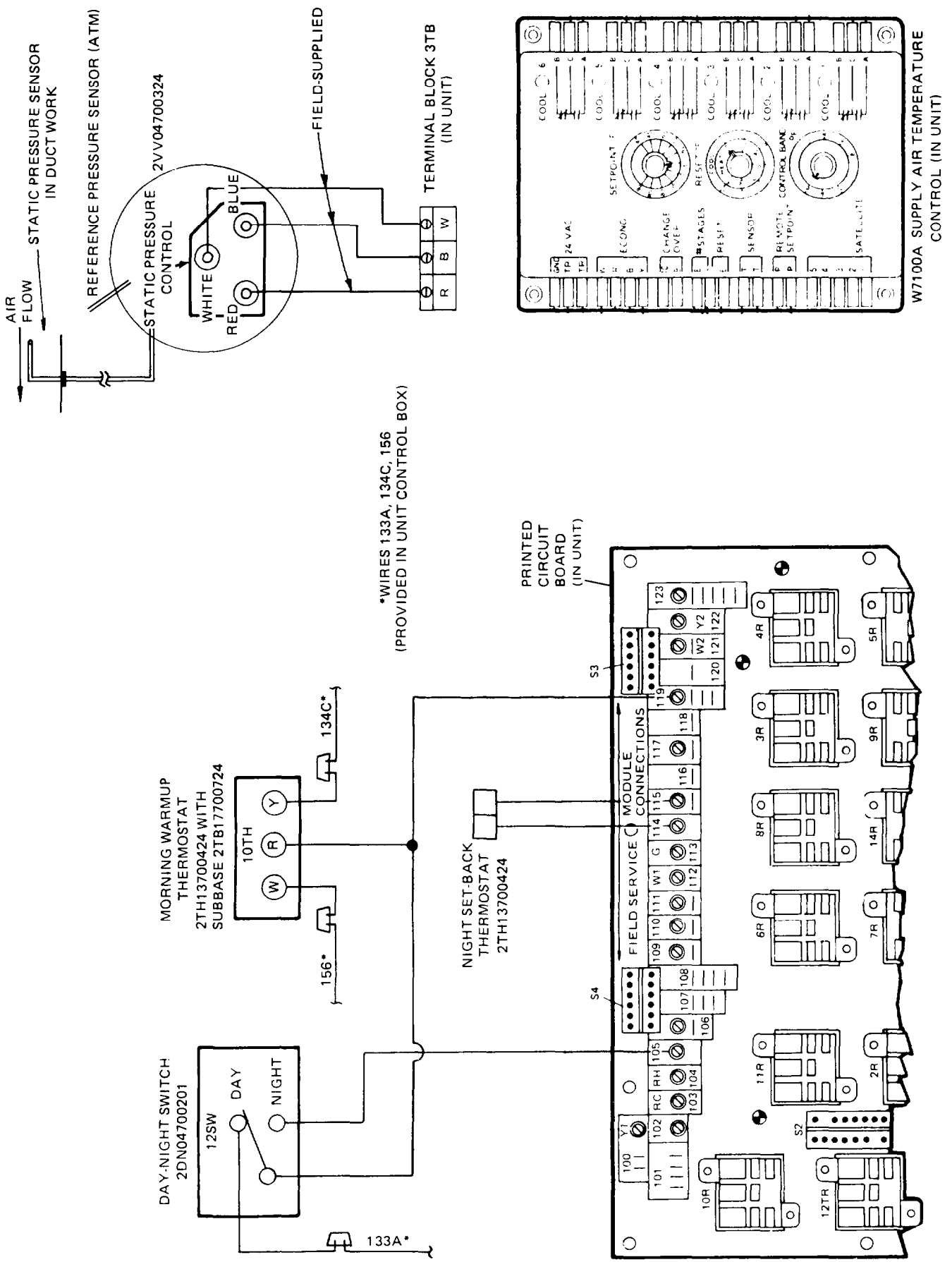


FIG. 9 – CONTROL WIRING AND STATIC PRESSURE CONNECTIONS (UNIT WITH AIR VOLUME DAMPERS)

TABLE 3 — (A) ELECTRICAL DATA — UNITS WITHOUT EXHAUST AIR FANS[1]

Model DSV		Compressors					Supply Air Blower Motor (3-Phase)			Condenser Fan Motors (1-Phase)			Unit Ampacity, Amps	Max. Fuse Size,[3] Amps	Min. Wire Size,[4] AWG/MCM	Max. Wire Length,[5] Feet
		Volts	Nominal Tons(*)	RLA	LRA	Power Factor[2]	Volts	HP	FLA	Volts	HP(*)	FLA				
300	17	208	25 (1)	101	470	0.84	200	7-1/2 10	25 32	200	3/4 (3)	4.2 ea.	165 175	200	00	200 185
	28	230	25 (1)	92	470	0.76	230	7-1/2 10	22 28	230	3/4 (3)	4.2 ea.	150 160	175 200	0 00	205 230
	46	460	25 (1)	46	235	0.76	460	7-1/2 10	11 14	460	3/4 (3)	2.4 ea.	80	90	4	360
	58	575	25 (1)	37	200	0.76	575	7-1/2 10	9 11	460[6]	3/4 (3)	2.4 ea.	65	80	6	365
360	17	208	30 (1)	126	565	0.90	200	10 15	32 48	200	1/2 (6)	3.4 ea.	210 230	250 300	0000	225 205
	28	230	30 (1)	122	565	0.81	230	10 15	28 42	230	1/2 (6)	3.4 ea.	205 215	250	0000	250 235
	46	460	30 (1)	61	283	0.81	460	10 15	14 21	460	1/2 (6)	2.0 ea.	105 110	125	2	400 385
	58	575	30 (1)	49	230	0.81	575	10 15	11 17	460[6]	1/2 (6)	2.0 ea.	85 95	100 110	4 3	405 450
480	17	208	20 (2)	83 ea.	428 ea.	0.90 ea.	208	15 20	48 59	200	1/2 (6)	3.4 ea.	255 270	300	250 300	205 220
	28	230	20 (2)	80 ea.	428 ea.	0.81 ea.	230	15 20	42 54	230	1/2 (6)	3.4 ea.	245 255	300	250	230 220
	46	460	20 (2)	40 ea.	214 ea.	0.81 ea.	460	15 20	21 27	460	1/2 (6)	2.0 ea.	125 130	150	1	405 390
	58	575	20 (2)	33 ea.	160 ea.	0.81 ea.	575	15 20	17 22	460[6]	1/2 (6)	2.0 ea.	105 110	125	2	500 480

* Quantity listed in ( ).
[1] Refer to the following table for electrical data of unit with exhaust air fans.
[2] Rated at a 45°ET and a 130°CT.
[3] Dual element, time delay type.
[4] Based on three 75°C, insulated copper conductors in steel conduit.
[5] Based on a 3% voltage drop.
[6] A 575 to 460 volt transformer is provided for these motors.

TABLE 3 — (B) ELECTRICAL DATA — UNITS WITH EXHAUST AIR FANS[1]

Model DSV		Supply Air Blower Motor HP	Exhaust Air Fan Motors (1-Phase)			Unit Ampacity, Amps	Max. Fuse Size,[2] Amps	Min. Wire Size,[3] AWG/MCM	Max. Wire Length,[4] Feet
			Volts	HP(*)	FLA				
300	17	7-1/2 10	200	3/4 (2)	4.2 ea.	175 180	200 225	00 000	185 215
	28	7-1/2 10	230	3/4 (2)	4.2 ea.	160 165	200	00	230 220
	46	7-1/2 10	460	3/4 (2)	2.4 ea.	85	100	4	335
	58	7-1/2 10	460[5]	3/4 (2)	2.4 ea.	70	80	4	510
360	17	10 15	200	3/4 (2)	4.2 ea.	220 235	250 300	0000 250	215 220
	28	10 15	230	3/4 (2)	4.2 ea.	210 225	250 300	0000	245 225
	46	10 15	460	3/4 (2)	2.4 ea.	110 115	125 150	2	385 365
	58	10 15	460[5]	3/4 (2)	2.4 ea.	90 100	110	3	475 425
480	17	15 20	200	3/4 (3)	4.2 ea.	270 280	300 350	300	220 210
	28	15 20	230	3/4 (3)	4.2 ea.	255 270	300	250 300	220 230
	46	15 20	460	3/4 (3)	2.4 ea.	135 140	150	0	450 435
	58	15 20	460[5]	3/4 (3)	2.4 ea.	115 120	125	2 1	460 525

* Quantity listed in ( ).
[1] Refer to table above for electrical data on compressors and fan motors.
[2] Dual element, time delay type.
[3] Based on three 75°C, insulated copper conductors in steel conduit.
[4] Based on a 3% voltage drop.
[5] A 575 to 460 volt transformer is provided for these motors.

TABLE 3 – (C) ELECTRICAL DATA – UNITS WITH ELECTRIC HEAT[1]

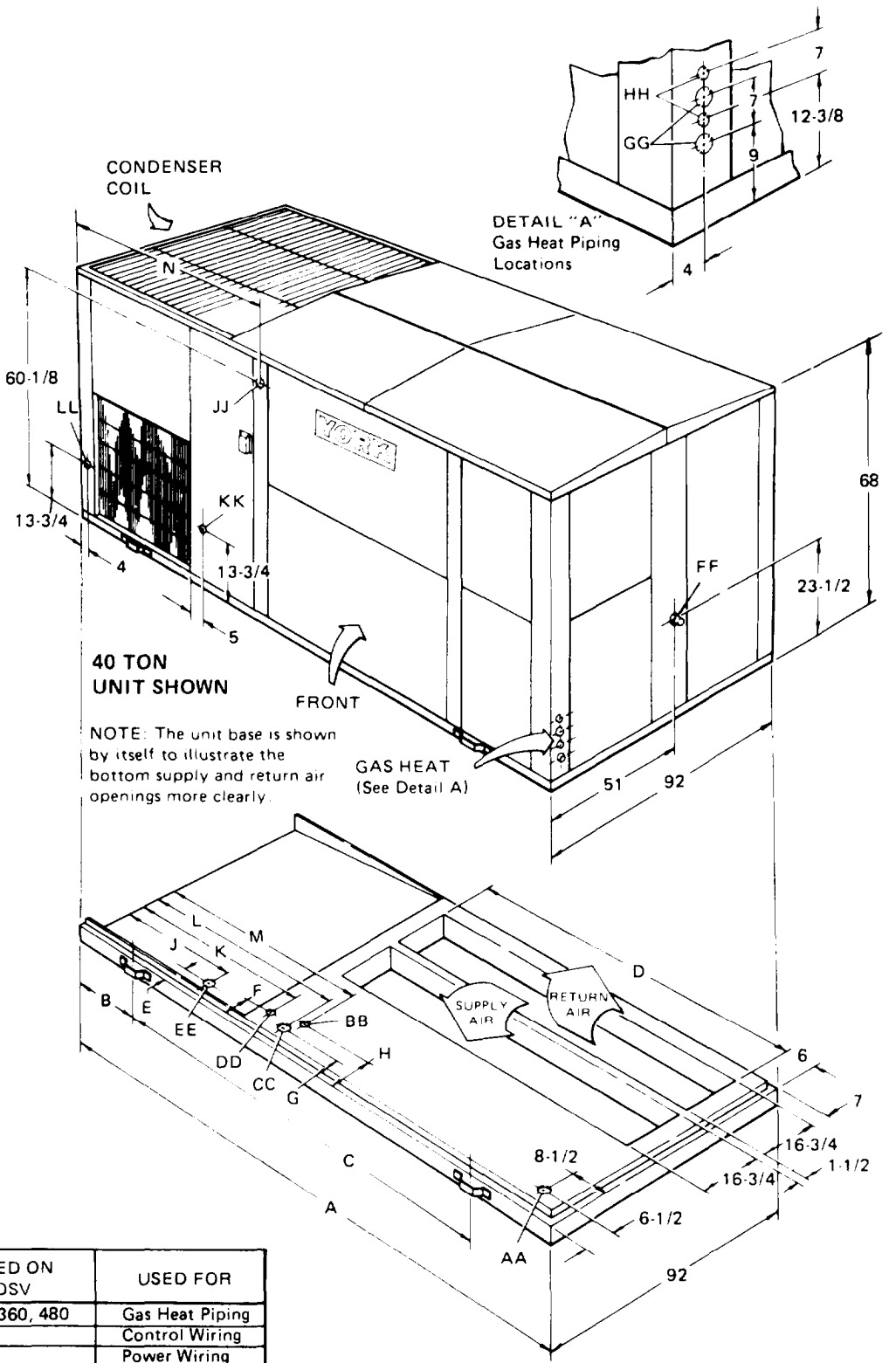
Unit Size	Volt/ Hertz	Power Supply Volts	Electric Heat Option Model	Nominal kW	F.L.A.	Supply Air Blower Motor HP	Supply Air Blower Motor F.L.A.	Unit Ampacity Amps	Max. Fuse or Ckt. Brkr. Size Amps	Min. Wire Ampacity Amps	Min. Circuit Ampacity Amps	Exhaust Air Blower Motor Amps	Max. Fuse or Ckt. Brkr. Size Amps	Min. Wire Ampacity Amps	Min. Circuit Ampacity Amps
300	17	208	E040	30	83	7-1/2 10	25 32	165 175	200	00	230 215	175 180	200 225	00 000	215 260
	28	230	E040	40	96	7-1/2 10	22 28	150 160	175 200	0 00	225 265	160 170	200	00	265 245
	46	460	E040	40	48	7-1/2 10	11 14	80	90 100	3	450	85	100	3	430
	17	**208**	**E060**	**45**	**125**	**7-1/2 10**	**25 32**	**165 175**	**200**	**000**	**245 235**	**175 185**	**200 225**	**000 0000**	**235 275**
	28	**230**	**E060**	**60**	**144**	**7-1/2 10**	**22 28**	**180**	**200**	**000**	**300 290**	**185 190**	**200**	**000**	**285 275**
	46	**460**	**E060**	**60**	**72**	**7-1/2 10**	**11 14**	**90**	**100**	**2**	**470**	**95 100**	**100**	**2 3**	**450 340**
	17	208	E080	60	167	7-1/2 10	25 32	200 210	200 225	000 0000	235 275	210 220	225	0000	275 260
	28	230	E080	80	192	7-1/2 10	22 28	220 230	225 250	0000	290 280	230 240	250	0000 250	280 325
	46	460	E080	80	96	7-1/2 10	11 14	110 115	125	2	380 360	120	125	1	440
	17	208	E100	75	208	7-1/2 10	25 32	240 250	250	250	290 280	250 260	250 300	250 300	280 325
	28	230	E100	100	240	7-1/2 10	22 28	270 275	275	300	350 340	280 290	300	300 350	335 330
	46	460	E100	100	120	7-1/2 10	11 14	135 140	150	0	490 480	140 145	150	0	480 460
360	17	208	E040	30	83	10 15	32 48	210 230	250 300	0000	275 250	220 235	250 300	0000 250	260 295
	28	230	E040	40	96	10 15	28 42	205 215	250	0000	315 300	210 225	250 300	0000	310 285
	46	460	E040	40	48	10 15	14 21	105 110	125	2	400 380	110 115	125 150	2	380 360
	17	**280**	**E060**	**45**	**125**	**10 15**	**32 48**	**210 230**	**250 300**	**0000**	**275 250**	**220 235**	**250 300**	**0000 250**	**260 295**
	28	**230**	**E060**	**60**	**144**	**10 15**	**28 42**	**205 215**	**250**	**0000**	**315 300**	**210 225**	**250 300**	**0000**	**310 285**
	46	**460**	**E060**	**60**	**72**	**10 15**	**14 21**	**105 110**	**125**	**2**	**400 380**	**110 115**	**125 150**	**2**	**380 360**
	17	208	E080	60	167	10 15	32 48	210 230	250	0000	275 250	220 240	250 300	0000 250	260 290
	28	230	E080	80	192	10 15	28 42	230 245	250	0000 250	280 320	240 225	250 300	250	325 305
	46	460	E080	80	96	10 15	14 21	115 125	125	2 1	360 420	120 130	125 150	1	440 400
	17	208	E100	75	208	10 15	32 48	250 270	250 300	250 300	280 315	260 280	300	300	325 300
	28	230	E100	100	240	10 15	28 42	275 295	300	300 350	340 370	290 305	300 350	350	375 360
	46	460	E100	100	120	10 15	14 21	140 150	150	0	480 450	145 155	150 175	0 00	460 540
	46	460	E120	120	144	10 15	14 21	165 170	175	00	530 510	170 180	175 200	00	510 490
480	17	208	E040	30	83	15 20	48 59	255 270	300	250 300	275 315	270 280	300	300	315 300
	28	230	E040	40	96	15 20	42 54	245 255	300	250	320 305	255 270	300	250 300	305 350
	46	460	E040	40	48	15 20	21 27	125 130	150	1	420 400	135 140	150	0	530 480
	17	208	E060	45	125	15 20	48 59	255 270	300	250 300	275 315	270 280	300	300	315 300
	28	230	E060	60	144	15 20	42 54	245 255	300	250	320 305	255 270	300	250 300	305 350
	46	460	E060	60	72	15 20	21 27	125 130	150	1	420 400	135 140	150	0	490 480
	17	**208**	**E080**	**60**	**167**	**15 20**	**48 59**	**255 270**	**300**	**250 300**	**275 315**	**270 280**	**300**	**300**	**315 300**
	28	**230**	**E080**	**80**	**192**	**15 20**	**42 54**	**245 255**	**300**	**250**	**320 305**	**260 275**	**300**	**300**	**365 340**
	46	**460**	**E080**	**80**	**96**	**15 20**	**21 27**	**125 130**	**150**	**1**	**420 400**	**135 140**	**150**	**0**	**490 480**
	17	208	E100	75	208	15 20	48 59	270 290	300	300	315 295	285 305	300 350	300 350	295 325
	28	230	E100	100	240	15 20	42 54	295 310	300 350	350	370 355	310 325	350	350 400	355 385
	46	460	E100	100	120	15 20	21 27	150 155	150 175	0 00	450 540	160 165	175	00	530 510
	46	460	E120	120	144	15 20	21 27	175 180	175 200	00 000	480 580	180 190	200	000	580 550

DSV units with electric heat.

[1] Refer to the previous page for electrical data on compressors and fan motors.
[2] Dual element, time delay fuses are required to handle the inrush current during compressor start-up.
[3] Based on three 75°C, insulated copper conductors in steel conduit.
[4] Based on a 3% voltage drop.

MINIMUM CLEARANCES	
FRONT	
Control Box Side	36"
REAR	36"
LEFT SIDE	
Condenser Coil	36"
RIGHT SIDE	
Cooling Only Units	36"
Electric Heat Units	36"
Gas Heat Units	90"
BOTTOM	0"
TOP	120"

All dimensions are in inches. They are subject to change without notice. Certified dimensions will be provided upon request.



DIM.	MODEL DSV		
	300	360	480
A	141	164	184
B	17	32	32
C	107	100	120
D	100	100	120
E	4-5/8	4-5/8	–
F	5	5	–
G	–	–	5-5/8
H	–	–	11-1/4
J	19	42	–
K	32-1/2	55-1/2	–
L	–	–	65
M	–	–	73
N	34-3/8	57-3/8	77-1/2

HOLE	OPENING SIZE & TYPE	USED ON DSV	USED FOR
AA	4-1/2 Dia. Sleeve	300, 360, 480	Gas Heat Piping
BB	2-1/4 Dia. Sleeve	480	Control Wiring
CC	4-1/2 Dia. Sleeve	480	Power Wiring
DD	2-1/4 Dia. Sleeve	300, 360	Control Wiring
EE	4-1/2 Dia. Sleeve	300, 360	Power Wiring
FF	1-1/2 Pipe	300, 360, 480	Drain Conn.
GG	2-5/8 KO	300, 360, 480	Gas Heat Piping[1]
HH	2-3/8 KO	300, 360	Gas Heat Piping[2]
JJ	1-1/8 KO	300, 360, 480	Control Wiring
KK	3-5/8 KO	480	Power Wiring
LL	3-5/8 KO	300, 360	Power Wiring

[1] Heating Option G560 & G800.
[2] Heating Option G400
} See Form 530.25-N1.1

FIG. 10 – UNIT DIMENSIONS

Refer to the following accessory instructions for additional control wiring information.

Firestat	Form 690.50-N1
Status Panel	Form 530.11-N10.1
Pumpdown Kit	Form 530.25-N1.8
Night Setback Relay	Form 530.11-N10.4

DUCT CONNECTIONS

The supply and return air duct can be connected to the support angles which are part of the roof curb package. This allows the installation of the duct work and roof curb before installing the unit. All duct connections are contained within the roof curb. Refer to Fig. 11 for duct connection dimensions for the bottom side-by-side arrangement.

Refer to Form 55.70-N1 for suggested means of installing and insulating ducts.

When a unit is used with a ceiling plenum return air system, sound may be transmitted from the unit thru the ceiling to the conditioned space. For such applications, there must be a sound absorption chamber installed on the unit return air inlet as shown in Figure 12. In this way, sound generated by the unit is absorbed in the chamber and not transmitted to the conditioned space. The chamber may be constructed of fiberglass duct or metal duct lined with sound absorption material. Ceiling return grilles should be located a minimum of 12 feet from the end of the sound chamber. In every installation a return air duct must be installed to the unit.

FILTERS

All filters being used in these units are 2" thick. Throwaway filters or 55% efficient bag type filters are available as factory options. Cleanable filters or 30% efficient throwaway filters are available as accessories. The cleanable filters have an aluminum mesh media that may be cleaned in hot water or steam, reoiled and reused indefinitely. The 30% and 55% efficient filters are available to meet specifications for improved air filtration. Refer to Table 4 for filter sizes and quantities.

TABLE 4 – FILTER REQUIREMENTS

Unit Model	2" Throwaway 2" Cleanable 2" 30%	55% Bag
DSV300	(10) 2 x 20 x 25	(4) 12 x 20 x 24 (4) 12 x 24 x 24
DSV360	(6) 2 x 20 x 25 (9) 2 x 20 x 20	(4) 12 x 20 x 24 (4) 12 x 24 x 24
DSV480	(6) 2 x 20 x 25 (12) 2 x 20 x 20	(5) 12 x 20 x 24 (5) 12 x 24 x 24

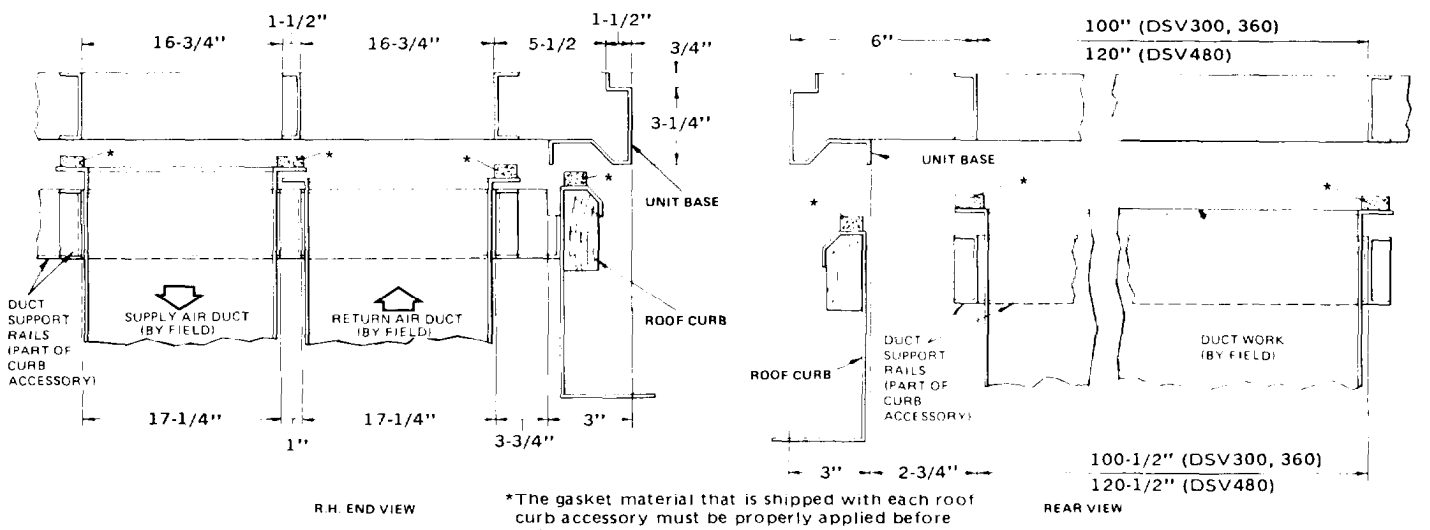


FIG. 11 – DUCT CONNECTIONS

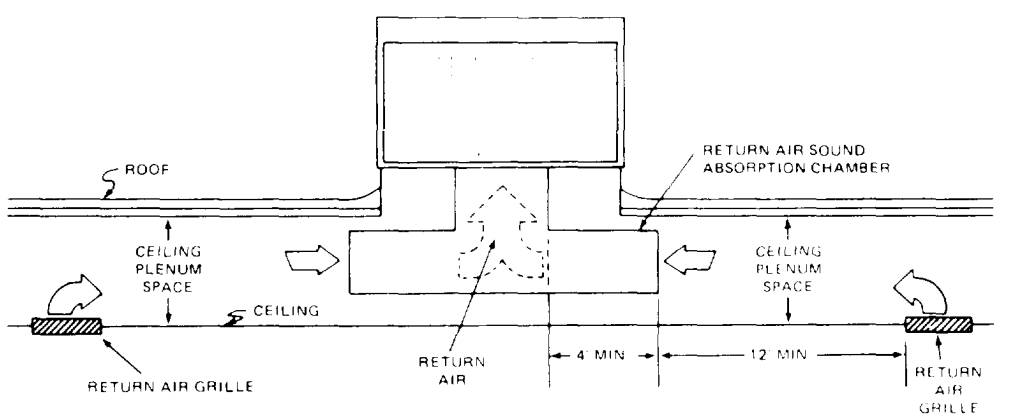


FIG. 12 – SOUND ABSORPTION CHAMBER

ECONOMIZER RAIN HOOD OPTION

The outdoor and return air dampers, the spring-return damper actuator, the linkage, the enthalpy changeover control, the mixed air temperature control and the minimum position potentiometer with manual auto switch are factory mounted as part of the economizer option. The rain hood is shipped in a separate package and must be assembled to the unit per the assembly instructions in Form 530.25-N1.4.

CAUTION: Never operate the unit without installing the hood or moisture will be drawn into the unit.

FIXED OUTDOOR AIR RAIN HOOD

The fixed outdoor air damper with a manual adjustment arm is factory mounted on all units without the economizer option. The rain hood is shipped in a separate package and must be assembled to the unit per the assembly instructions in Form 530.25-N1.3.

CAUTION: Never operate the unit without installing the hood or moisture will be drawn into the unit.

EXHAUST AIR RAIN HOOD OPTION

The barometric exhaust dampers, the powered propeller exhaust fan and the damper motor end switch are factory installed and wired as part of the exhaust air option. The rain hood is shipped in a separate package and must be assembled to the unit per the assembly instructions in Form 530.25-N1.2.

NOTE: The exhaust hood for the DSV 480 is shipped in two packages.

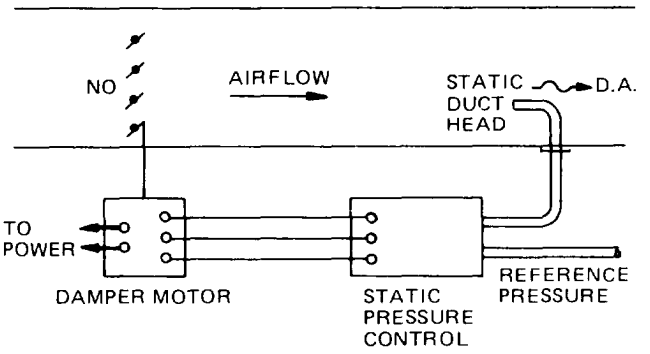
CAUTION: Never operate the unit without installing the hood or moisture will be drawn into the unit.

STATIC PRESSURE REGULATOR ACCESSORY

The Static Pressure Regulator must be field installed. Selection of best location and setpoint are the responsibility of the system designer. Refer to Figure 560.20-N2.2 for Installation Instructions.

OPERATION OF STATIC PRESSURE CONTROL

When static pressure exceeds the static pressure setting, the control completes an electrical circuit to the damper motor. The motor changes the dampers to a position that reduces the static. When the static reduces to the setpoint of the control, the electrical circuit is broken, stopping the motor in this new position. A second contact drives the motor in the opposite direction on a decrease in static.



OPERATION

D_SV VARIABLE AIR VOLUME

The operation of the D_SV unit can be divided into five systems.

1. Economizer System (optional).
2. Heating System (optional – used for night setback and morning warmup only).
3. Cooling System.
4. Exhaust Air (optional).
5. Variable Air Volume Dampers (optional).

GENERAL

Variable air volume (VAV) systems operate on the principle that space temperature can be maintained by varying the volume of constant temperature air delivered to the space. As the space load decreases, air delivered to the space is pinched off. The optional variable air volume dampers will then close to hold a constant duct static pressure. With less air required, both the fan and compressor require less horsepower, and operating costs are reduced.

The D_SV is a cooling only unit. Electric heat can be added for use during night setback or morning warmup only. During normal operation the heat is locked out.

The D SV control is a microprocessor based Honeywell W7100 discharge air controller with a discharge air sensor. The control tries to maintain a fixed discharge air temperature by modulating the economizer and sequencing stages of mechanical cooling. The discharge air setting is field adjustable but is set at 55°F by the factory. The control also has an adjustable control band. The control band adjustment sets a region of temperature centered around the discharge air set point.

The control energizes or de-energizes cooling stages and optional economizer to maintain the discharge air (D/A) temperature in the control band.

It is recommended that the control band be set as shown:

8°F for D_SV300
7°F for D_SV360
6°F for D_SV480

The controller has a built in feature which provides a 4 minute off cycle and a 4 minute on cycle to prevent compressor rapid cycling.

When power fails, the W7100 shuts off all stages of mechanical cooling. When power resumes, the economizer will first be modulated open, provided enthalpy of the outside air is suitable. Once the economizer is open, mechanical cooling is sequenced back on with a minimum of 4 minutes between succeeding stages. If outside air enthalpy is not suitable, economizer modulation is bypassed, allowing mechanical cooling to begin sequencing after 4 minutes, with a minimum of 4 minutes between stages.

When the D_SV does not have economizer option, a 510 ohm, 1/4 watt, 5% resistor is placed between terminals 9 and Y on the W7100 to eliminate the economizer delay and energize mechanical cooling immediately.

COOLING

When the discharge temperature has deviated 1°F above (or below) the control band, additional stages of cooling will be turned on (or off) at four minute intervals until either the discharge temperature drops (or rises) to within one degree of the control band, or the discharge temperature falls (or rises) at a sufficient rate that will insure that discharge temperature will soon be within the control band (about 10 minutes). The rate feature prevents needless cycling caused by changes in load. The last stage to be turned on or off is referred to as cycling stage.

D_SV units have nominal cooling capacities of 25, 30 and 40 tons. The D SV300 has two stages of capacity achieved by unloading a single compressor. The D_SV360 has three stages of capacity achieved by two unloading solenoids on one compressor. The D SV480 has four stages of capacity achieved by two compressors each with an unloader.

All systems are completely factory assembled, refrigerant piped, refrigerant charged and leak tested. A strainer drier and a moisture indicator are installed in each liquid line. A high pressure cutout is located in each system('s) on the compressor before the discharge valve and will de-energize the compressor control circuit should the system('s) discharge pressure exceed 395 psig. The pressure cutout will remain de-energized until the system('s) pressure returns to 310 psig. The opening of the high pressure cutout will energize the lockout circuit. The control circuit must be opened and closed to reset the lockout circuit. Anticycle timing is part of the compressor protection module. This prevents the compressor('s) from rapid short cycling. A low pressure cutout is located in each system('s) on the compressor before the suction valve and will de-energize the compressor control circuit should the system('s) pressure drop to 7 psig. This control will automatically reset when the suction pressure rises to 22 psig. The opening of the low pressure cutout will energize the lockout circuit.

The control circuit must be opened and closed to reset the lockout circuit.

Normal sequence of operation is as follows:

1. Power is supplied to the unit through the disconnect switch. The switch can be field-installed or factory-installed as an option.

2. As soon as power is supplied to the unit, the compressor crankcase heaters 1TH (and 2TH) will be energized.

CAUTION: Do not attempt to start the compressors without at least 8 hours of crankcase heat or compressor damage will occur.

3. If the unit is not equipped with a morning warmup thermostat or a day-night switch the 7R relay coil will be energized. The 7R contact closes energizing the 3M coil. 3M contacts close, starting the supply air fan motor. After an adequate air flow is established, 5 LP closes to energize 6R coil. 6R contact closes in the compressor control circuit. If the unit has a day-night switch the switch must be in the day position. If the unit has a morning warmup thermostat it must be satisfied or the above fan and unit operation will not occur.

4. If the D_SV unit does not have an economizer cycle or if the outdoor enthalpy is too high, on demand , the discharge air sensor will signal the logic panel to close the "Cool 1" contacts and energize 1R coil.

5. 1R contact closes and energizes 1M coil, which starts the (No. 1) compressor in an unloaded condition. At the same time, 4M is energized to start the condenser fans.

6. If the discharge air temperature is not within 1°F of the control band the logic panel will energize the following stages.

   a. "Cool 2" contacts will energize. On the D_SV300 this energizes the 2R relay. The 2R contacts close de-energizing the compressor unloading solenoid which loads the compressor. On the D_SV360 this energizes the 2R relay. The 2R contacts close de-energizing the compressor unloading solenoid which loads the compressor to 2/3 or full capacity. On the D_SV480 this de-energizes the compressor unloading solenoid which loads the No. 1 compressor.

   b. "Cool 3" contacts will energize. On the D_SV360 this de-energizes the compressor unloading solenoid which loads the compressor to full capacity. On the D_SV480 this energizes the 2R relay. The 2R contacts close and energize 2M coil which starts the No. 2 compressor in an unloaded condition.

   c. "Cool 4" contacts will energize. On the D_SV480 this de-energizes the compressor unloading solenoid which loads the No. 2 compressor.

7. The compressor short cycle time and low voltage protection is part of the solid state compressor protection module. It prevents a compressor from starting unless it has

been off for five minutes. It also monitors the voltage of the 120 volt control circuit and will shut down the compressor if the 120 volt control voltage drops below 85 ± 4.5 volts.

8. To maintain sufficient head pressure during low ambient operation condenser fan No. 1 on the D_SV300 and condenser fans No. 1 and 2 on the D_SV360 and D_SV480 will be de-energized by 1TH. Condenser fan No. 2 on the D SV300 and condenser fans No. 3 and 4 on the D_SV-360 and D_SV480 will be de-energized by 2TH. (Refer to Table 5.)

TABLE 5 — AMBIENT THERMOSTAT SETTING

UNIT	1TH	2TH
DSV300	55 ± 6°F	25 ± 6°F
DSV360	55 ± 6°F	25 ± 6°F
DSV480	55 ± 6°F	35 ± 6°F

ECONOMIZER SYSTEM

The Economizer System consists of:

1. Outdoor and return air dampers.
2. Damper Actuator (Spring Return).
3. Enthalpy Control - 5TH.
4. Minimum outdoor air adjustor (potentiometer) - 2RH.

The Economizer system provides the first stage of cooling whenever the outdoor air is cool and dry enough to satisfy the internal cooling demand. The outdoor and the return air dampers are mechanically linked and are modulated by the spring return damper actuator. As the outdoor air dampers are opened by the damper actuator the return air dampers are closed.

When the enthalpy control (5TH) senses outdoor air temperatures per Table 6, the outdoor air dampers close to their minimum position. The minimum position of the outdoor air dampers is determined by the set point of the minimum outdoor air adjustor (2RH). The minimum outdoor air adjuster is factory mounted in the top of the damper motor.

The enthalpy control (5TH) is factory set. It senses both temperature and humidity and varies its setting so as to limit the introduction of outdoor air. As noted in Table 6, the control will not allow outdoor air to enter the unit during high humidity conditions except at a lower outdoor temperature. During dry conditions, air is introduced at a higher ambient.

TABLE 6 — ENTHALPY CONTROL (SET POINT "B")

Relative Humidity %	Set Point of Enthalpy Control					
	Max.	A	B*	C	D	Min.
	Changeover Temperature, °F DB					
80	72	67	62	57	51	44
60	77	72	67	62	57	51
40	82	76	71	66	61	55
20	84	78	73	68	63	57
10	84	79	74	69	64	58

*Factory set point.

The economizer uses the bottom of the control band as its set point. This is done to allow the control to keep discharge air temperature on the cool side if the cooling is "free".

If the enthalpy is high, the device will not wait for the internal economizer timings to occur before going into the compressor algorithm, (program). On high enthalpy, the first stage of compressor cooling will come on approximately four minutes later.

The outdoor and return air dampers are controlled by the logic panel. The logic panel will modulate the dampers from a signal from the discharge air sensor and attempt to hold the discharge air temperature at the control set point.

If the economizer cannot satisfy the space demand for cooling, mechanical cooling stages are energized as needed.

DAMPER LINKAGE ADJUSTMENT

After power has been supplied to the unit, the outdoor and return air dampers should be checked to make sure they operate freely and close tightly. It may be necessary to readjust the linkage between the damper motor and the blades due to loosening in shipment.

Readjust linkage as follows:

1. Turn the minimum outdoor air adjustor to the 100% outdoor air position. All return air damper blades should be fully closed. Be sure that the spring-return damper actuator has completed its stroke (stopped running). If not, loosen the drive rod bolt and let the damper motor drive the crankcase until the motor stops running. Retighten the drive rod bolt to secure the drive rod.

2. Turn the minimum outdoor air adjustor to the 0% outdoor air position. All outdoor air damper blades should be fully closed. The linkage connecting the outdoor air and the return air dampers must move freely.

3. Return the minimum outdoor air adjustor to the 100% outdoor air position and check for complete freedom of linkage movement as the return air dampers close.

4. Set the minimum outdoor air adjustor for the minimum ventilation requirement of the job.

HEATING SYSTEM

A gas or electric heating section is offered as a factory-mounted option. Refer to the heater instruction for additional information.

Gas Heat Option	Form 530.25-N1.1
Electric Heating Option	Form 530.25-N1.9

The heat on a D_SV unit will only operate when the unit is in the night mode of operation or during the morning warmup mode. During night setback the heat will cycle off of a separate heating thermostat. During morning warmup the heat is energized by the morning warmup thermostat. During any heating mode of operation the air flow operates at full flow.

AIR VOLUME CONTROL SYSTEM

The Air Volume System consists of:

1. Dampers. Air Volume Control, (factory option).
2. Control, Static Pressure Regulator, (field installed accessory).

As the air quantity required by the VAV outlet boxes decreases, the static pressure in the duct system increases. Optional modulating dampers can be ordered with the unit to provide a constant static pressure in the duct system at all flow conditions. The optional air volume dampers are controlled by the accessory static pressure regulator that is located in the conditioned space. As the duct static pressure increases above the set point, the static pressure control will modulate the air volume dampers to maintain the static pressure setpoint.

The static pressure regulator has a range of 0.01 to 6.0 inches of water column with a differential adjustment of 0.05 to 0.75 inches. The static pressure regulator is field connected to a terminal block in unit main control box.

CHECKING LINKAGE ON AIR VOLUME DAMPERS

After power has been supplied to the unit, the air volume dampers should be checked to make sure they operate freely and open/close properly. It may be necessary for the installer to adjust the linkage between the damper motor and the blades due to loosening in shipment.

CHECKOUT PROCEDURE

After electrical power is connected to the unit, the operation of the air volume dampers, damper motor, etc. can be checked.

The damper motor has electric wire leads. Wires "B1", "W1" & "R1" can be jumpered to cause the air volume damper motor to drive to the open position or the close position. The dampers and linkage should be checked for position and linkage should be checked to insure linkage is adjusted properly and tight with "open" and "closed" dampers.

1. Open Dampers – Jumper terminals "R1" and "W1" on damper motor.
2. Closed Dampers – Jumper terminals "R1" and "B1" on damper motor.

EXHAUST AIR SYSTEM

The exhaust air fans are energized by manually closing a circuit between terminals 60 and 64 of terminal block 2TB or automatically by an end switch on the economizer damper motor. As the economizer damper opens, it closes the end switch on the damper motor and turns on the exhaust air fans. The degree of blade opening at which the exhaust fans are energized can be adjusted by the following procedure. Refer to Figures 13 and 14.

1. Use the black scale plate as an indicator of motor position for switch operation.
2. Loosen the thumb nut and the cam locking screws.
3. Set the operational and differential cams.
4. Check switch adjustment by moving the adjustor 2RH to move the motor. Switch should click when desired make and break points are lined up with index mark and the exhaust fan should start and stop.

WARNING: 120 volt power is connected to the switch.

5. Tighten thumb nut.

CAUTION: Do not attempt to turn the motor shaft by hand or with a wrench as damage to the gear train will result.

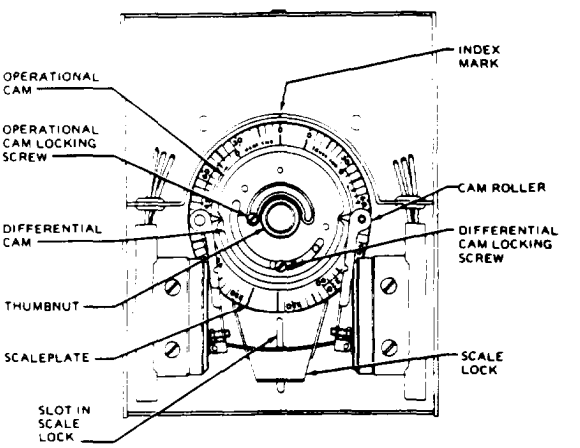


FIG. 13 – INTERNAL VIEW OF DAMPER MOTOR END SWITCH

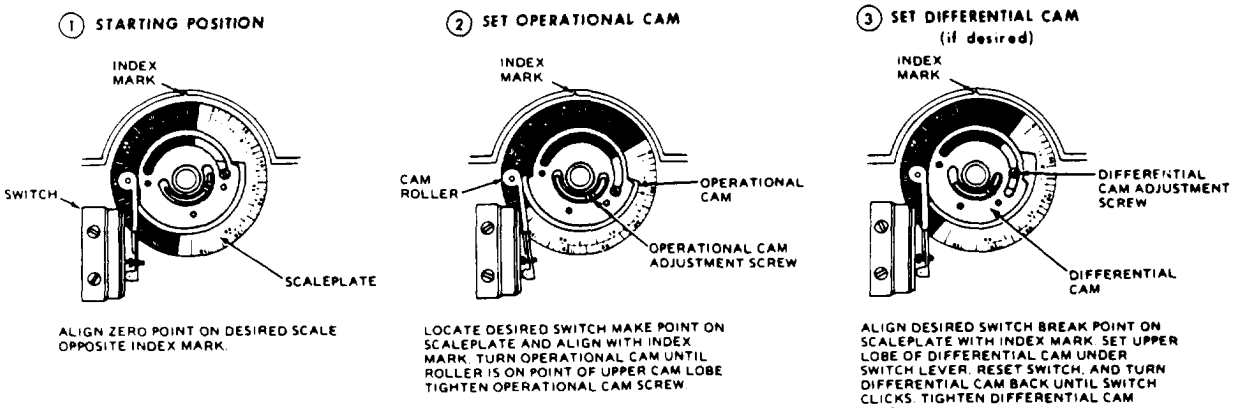


FIG. 14 – ADJUSTING DAMPER MOTOR END SWITCH

SUPPLY AIR BLOWER ADJUSTMENT

Knowing the required maximum CFM, the unit options, and the static resistances of both the supply and the return air duct systems, the RPM for the supply air blowers can be determined from the blower performance. (See Table 11.)

Knowing the required blower RPM and the blower motor HP, the setting (turns open) for the supply air motor pulley can be determined from Table 7. The 20 HP drive for the DSV480 has a fixed motor pulley and a fixed speed.

Each motor pulley has:

1. A threaded barrel with two flats (or notched recesses) 180 degrees apart.

2. Either one or two movable flanges, each with two set screws 180 degrees apart.

After the movable flange (or flanges) has been rotated to the proper number of "turns open", the set screws should be tightened against the flats on the barrel to lock the movable flange in place. If the pulley includes a locking collar, the locking collar must be loosened to adjust the setting of the movable flange.

Note the following:

1. The supply air CFM must be within the limitations shown in Table 1.

2. Both movable flanges on a 2-groove pulley must be adjusted to the same setting (turns open) to balance the loading on both belts.

3. All pulleys can be adjusted in half-turn increments.

TABLE 7 – SUPPLY AIR SYSTEM ADJUSTMENT

MODEL	TURNS OPEN[1]	RPM			
		7-1/2	10	15	20
DSV300	6	913	1025	–	–
	5	950	1062	–	–
	4	987	1099	–	–
	3	1024	1136	–	–
	2	1061	1173	–	–
	1	1098	1210	–	–
DSV360	6	–	780	924	–
	5	–	812	962	–
	4	–	844	1000	–
	3	–	876	1038	–
	2	–	908	1076	–
	1	–	940	1114	–
DSV480	6	–	–	924	–
	5	–	–	962	–
	4	–	–	1000	–
	3	–	–	1038	–
	2	–	–	1076	–
	1	–	–	1114	1190[2]

[1] Pulleys can be adjusted in half turn increments.
[2] Fixed pulleys, no adjustment.

4. The tension on each belt shall be adjusted per the following procedure. See Figure 15.

   a. Loosen two nuts (A).

   b. Adjust by turning (B).

   c. Never loosen nuts (C).

   d. Using a belt tension checker, apply a perpendicular force to one belt at the midpoint of the span as shown. The deflection force should be applied until the specified deflection distance is obtained.

   The deflection distance equals 1/64" per inch of span length.

   To determine the deflection distance from normal position use a straight edge from sheave to sheave as a reference line.

   The recommended deflection force is as follows:

BELT SECTION	DEFLECTION FORCE (LBS.)	
	MINIMUM	MAXIMUM
"B"	4	5
"C"	11	14

   e. Tension new belts at the max. deflection force recommended for the belt section. Check the belt tension at least two times during the first 24 hrs. of operation. Any re-tensioning should fall between the min. and max. deflection force values.

   f. After adjusting, retighten nuts (A).

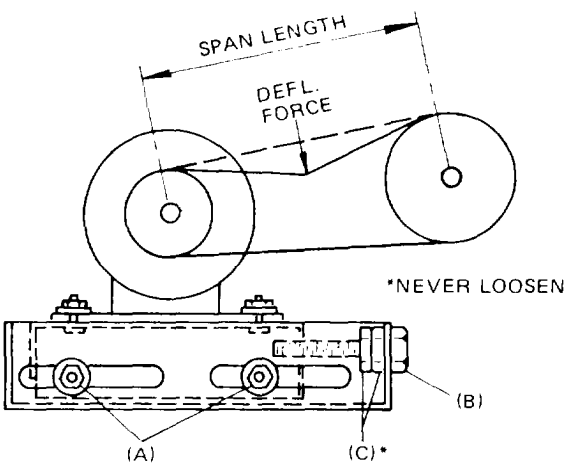


FIG. 15 – TYPICAL MOTOR MOUNTING ASSEMBLY

5. All pulleys are factory aligned.

6. All supply air motor pulleys are factory set at 2 "turns open" except for 20 HP motor.

After the pre-start check list has been completed:

1. Start the supply air blowers.

2. Adjust the resistances in both the supply and the return duct systems to balance the air distribution throughout the conditioned space. The job specifications may require that this balancing be done by someone other than the equipment installer.

To check the supply air CFM after the initial balancing has been completed:

1. Drill two 5/16" holes (A & B) as shown in Figure 16.

2. Install two 1/4" O.D. tubes, one between the filters and the air entering side of the evaporator coil and one between the supply air blower(s) and the air leaving side of the evaporator coil.

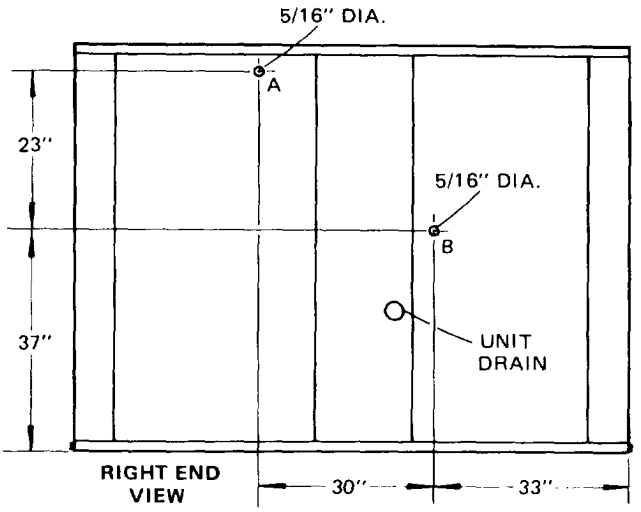


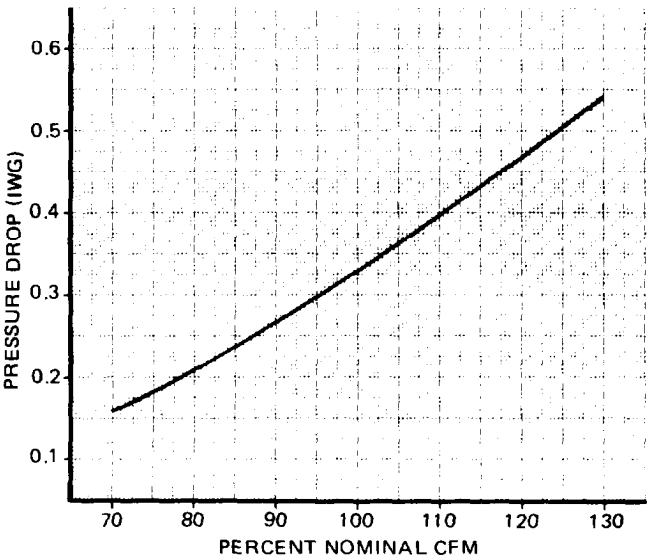
FIG. 16 – HOLE LOCATIONS FOR SUPPLY AIR CFM CHECK

NOTE: To get a proper static pressure reading, the sensing tubes should (A) be inserted through the rear or condensate drain side of the unit (B) be located approximately 6 inches away from the coil surface and as close to the center of the coil height as possible (C) extend into the unit approximately 12 inches.

3. Make sure that the access panels for both the supply air blower motor and the filters are secured. These panels do not have to be secured where the 1/4 inch tubes enter the units because the blower and filter compartments operate at a negative pressure.

4. Make sure that the tube openings are perpendicular to the air flow so that velocity pressure will not affect the static pressure readings.

CAUTION: If this method is used, the holes must be sealed with dot plugs (P/N 029-13880) or equivalent to prevent moisture from leaking into the unit.



MODEL	% OF NOMINAL CFM				
	80	90	100	110	120
	C.F.M.				
DSV300	8000	9000	10000	11000	12000
DSV360	9600	10800	12000	13200	14400
DSV480	12800	14400	16000	17600	19200

FIG. 17 – PRESSURE DROP ACROSS A DRY EVAPORATOR COIL VS SUPPLY AIR CFM

5. Using an inclined manometer, determine the pressure drop across a dry evaporator coil. Since the moisture on an evaporator coil may vary greatly, measuring the pressure drop across a wet coil under field conditions would be inaccurate.

NOTE: Disconnect the compressors before taking any test measurements to assure a dry evaporator coil.

6. Knowing the pressure drop across a dry coil, the actual CFM through the unit can be determined from the curve in Figure 17.

NOTE: On D SV units all air volume dampers in unit and terminal boxes in duct system must be open when checking air quantity.

If the CFM is above or below the specified value, the supply air motor pulley may have to be readjusted. After one hour of operation, check all belts and pulleys for tightness and alignment.

WARNING: Failure to properly adjust the total system CFM can result in extensive blower damage.

MASTER PRINTED CIRCUIT BOARD & PLUG-IN RELAY ASSEMBLY

All of the control relays that are required for unit operation are mounted on the printed circuit board. Figure 9 shows this assembly which is located in the main control panel. All of the relays are of the plug-in variety; no wiring connections have to be removed to replace a relay. Since the relays are transparent, the mechanical contact switching can be observed for easier electrical troubleshooting.

The low voltage field wiring is to be connected along the top of the printed circuit board at the eyelet connections. Each terminal is marked both numerically and with letters corresponding to the set-back heating thermostat for easier installation.

Two jumper plugs, one red and one white, are located at the top of the board. When they are removed and replaced with the connectors of the service analyzer, the analyzer will override the discharge air control. All system functions such as heating, cooling, economizer, and night set-back can be simulated. Malfunction indicator lights are provided to determine which system has malfunctioned.

CAUTION: When removing the connectors of the service analyzer, the two jumper plugs (one red and one white) must be reinstalled into their proper sockets before the system can function.

The procedure for troubleshooting a unit with a service analyzer connected to its printed circuit board is outlined below.

SERVICE ANALYZER

The analyzer allows complete over-ride control of room thermostat from the units Printed Circuit Board located within the control box of the unit. From this position, the user can operate the system in cooling, heating, fan or economizer operation.

Make the following connections:

1. Prior to connecting the Service Analyzer, disconnect power to the unit (high voltage).

2. Remove the red and white, 12-wire, jumper plug connectors from the field service module connections located at the top of the printed circuit board by squeezing the releases on the sides of the plug. Remove wire 119G from the PCB.

3. Install the female portion of the 12-wire red analyzer plug into the red module connection and the white analyzer plug into the white module connection of the printed circuit board. See Table 8.

NOTE: Make sure that all switches on the service analyzer are in the "OFF" position prior to supplying power to the unit.

TABLE 8 – SERVICE ANALYZER FUNCTION CHART

SYSTEM FUNCTION	SWITCH POSITION					LIGHTS						PROPER OPERATION
	SYSTEM	HEAT	COOL	FAN	N.S.B.	ST. 1 HEAT	ST. 2 HEAT	ST. 1 COOL	ST. 2 COOL	ECON.	FAN	
Economizer 1st Stage	Cool	Off	St. 1 Econ	Auto On	Off	Off	Off	Off	Off	ON	On	Fan on, O.S.A. dampers operate to setting of mixed air control.
Economizer 2nd Stage	Cool	Off	St. 1 St. 2 Econ	Auto On	Off	Off	Off	On	Off	On	On	Fan on, Compr. #1 on, O.S.A. dampers operate to setting of mixed air control.
Compr. 1st Stage	Cool	Off	St. 1 Cpr.	Auto On	Off	Off	Off	On	Off	Off	On	Fan & Compr. #1 on, with O.S.A. dampers open to min. position.
Compr. 2nd Stage	Cool	Off	St. 1 St. 2 Cpr.	Auto On	Off	Off	Off	On	On	Off	On	Fan, Compr. #1,2, run with O.S.A. dampers open to min. position.
Heat 1st Stage	Heat	St. 1	Off	Auto On	Off	On	Off	Off	Off	Off	On	Heat section operates on reduced capacity.
Heat 2nd Stage	Heat	St. 1 St. 2	Off	Auto On	Off	On	On	Off	Off	Off	On	Heat section operates full capacity.
Night Setback (cool)	Cool	Off	St. 1 St. 2 Cpr.	Auto On	On	Off	Off	On	On	Off	Off	No cooling, econ. or fan operation
Night Setback (heat)	Heat	St. 1 St. 2	Off	Auto On	On	On	On	Off	Off	Off	Off	Heat & fan only operate from N.S.B. Thermostat.

FIXED OUTDOOR AIR ADJUSTMENT

To adjust the amount of fixed outdoor air, see Figure 18. Locate the amount of outdoor air required and the return duct static on the chart to determine the position in which to set the blades. The blades can be adjusted by varying the position of the adjustment arm on the left side of the fixed outdoor air damper.

EXHAUST AIR PERFORMANCE

See Figure 19 for the performance of the exhaust air fans. Locate the amount of return duct static on the left hand side of the chart. The amount of air which will be exhausted can be read from the bottom of the chart.

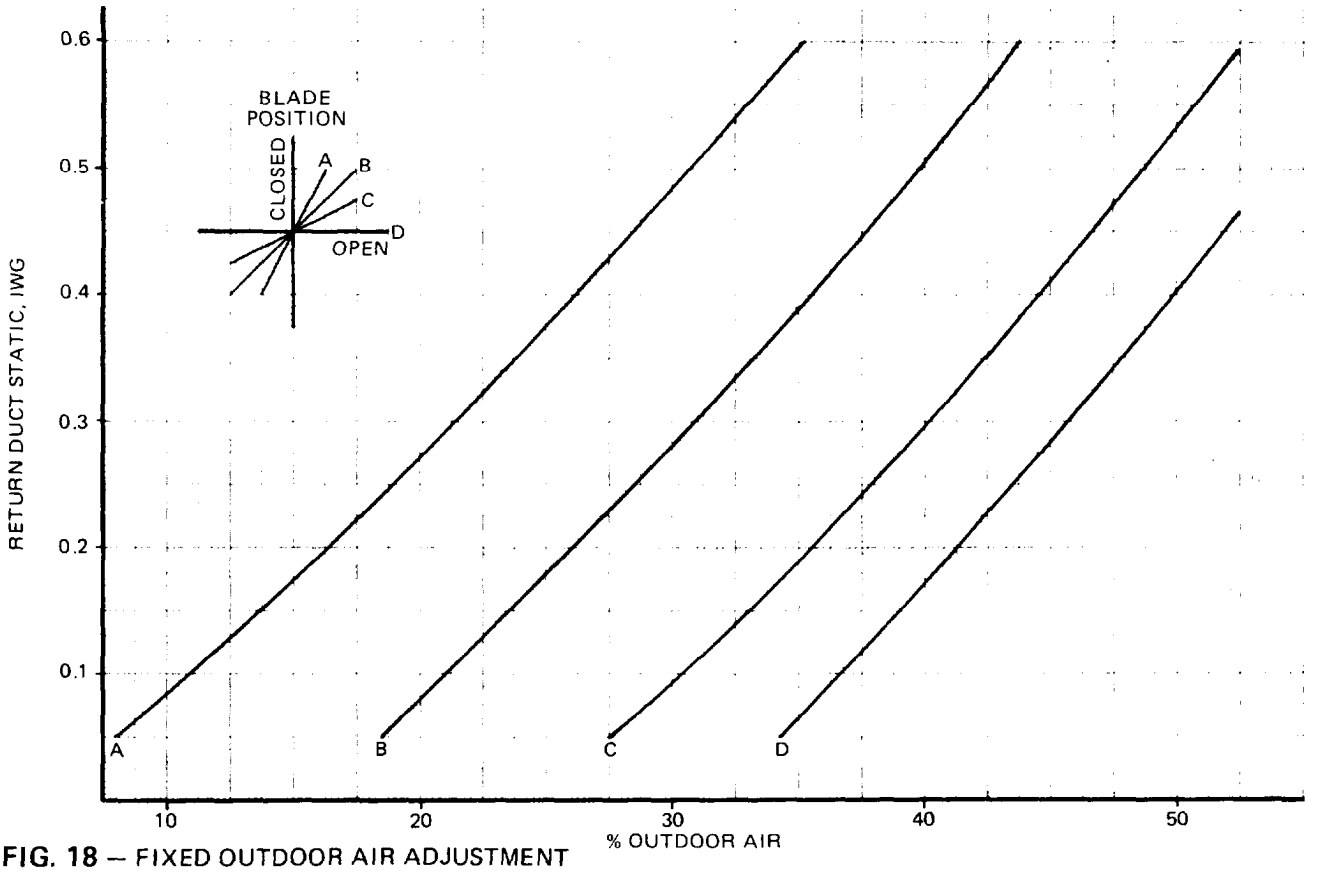


FIG. 18 – FIXED OUTDOOR AIR ADJUSTMENT

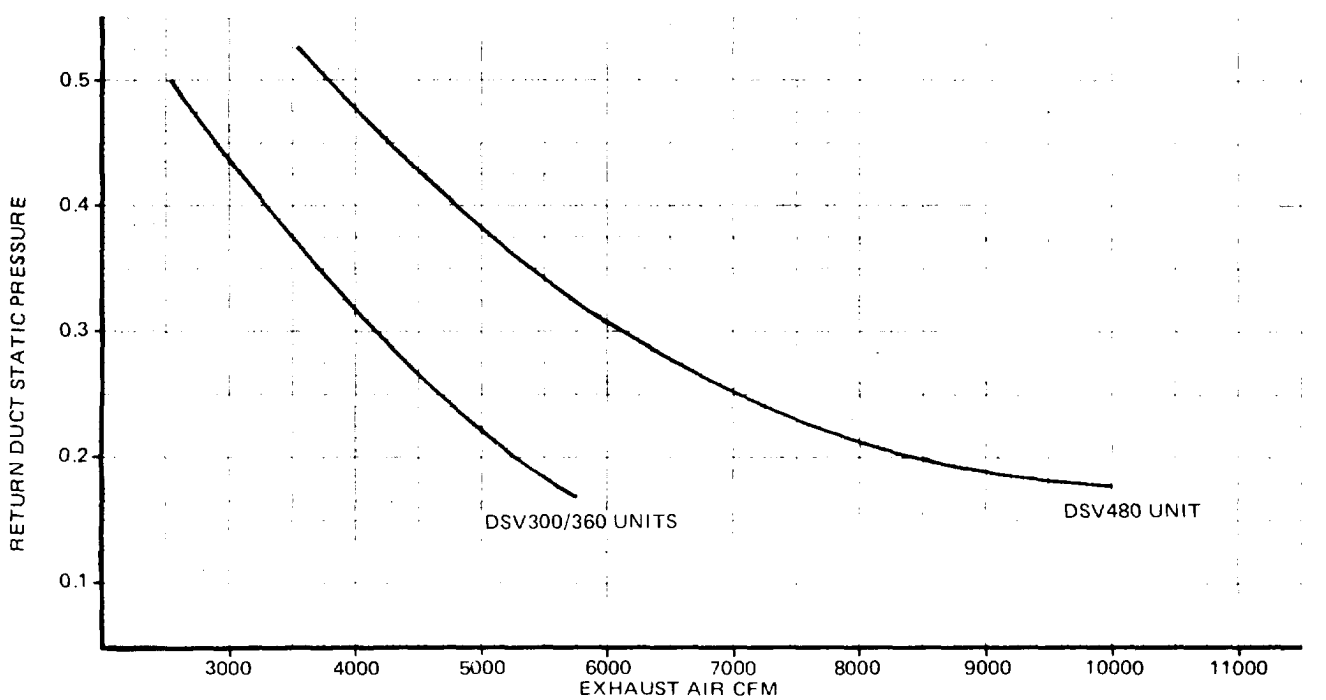


FIG. 19 – EXHAUST AIR PERFORMANCE – ALL FANS RUNNING

TABLE 9 —BLOWER MOTOR AND DRIVE DATA

MODEL DSV	BLOWER RPM RANGE	MOTOR[1]			ADJUSTABLE MOTOR PULLEY		FIXED BLOWER PULLEY		SUPER BELTS		
		HP	SERVICE FACTOR	FRAME SIZE	PITCH DIAMETER, INCHES	BORE INCHES	PITCH DIAMETER, INCHES	BORE INCHES	PITCH LENGTH, INCHES	DESIGNATION	QUANTITY
300	913-1098	7.5	1.15	213T	4.9-5.9	1-3/8	9.4	1-7/16	58.8	B57	2
	1025-1210	10	1.15	215T	5.5-6.5	1-3/8	9.4	1-7/16	58.8	B57	2
360	780-940	10	1.15	215T	4.9-5.9	1-3/8	11	1-15/16	63.8	B62	2
	924-1114	15	1.15	254T	5.8-7.0	1-5/8	11	1-15/16	63.8	B62	2
480	924-1114	15	1.15	254T	5.8-7.0	1-5/8	11	1-15/16	63.8	B62	2
	1190	20	1.15	256T	7.2*	1-5/8	10.6	1-15/16	62.9	C60	2

NOTE: All motors are 1750 RPM, have solid bases, and require starters with overloads, which are factory supplied.
*20 HP drive has a fixed motor pulley.

TABLE 10 —RESISTANCES FOR UNIT OPTIONS AND ACCESSORIES (IWG)

MODEL DSV	OPTION OR ACCESSORY	RESISTANCE (IWG) @ DESIGNATED CFM				
		8000	9000	10000	11000	12000
300	G400, G560 Gas Heat	0.01	0.02	0.02	0.03	0.03
	E040, 060, 080, 100, 120 Electric Heat	0.01	0.01	0.01	0.02	0.02
	Exhaust Air	0.01	0.02	0.02	0.03	0.03
	Economizer Return Air Damper for End Duct Connections	0.12	0.15	0.19	0.23	0.28
	Economizer Return Air Damper for Bottom Duct Connections	0.06	0.07	0.08	0.10	0.12
	2" 30% Efficient Filters[1]	0.01	0.01	0.01	0.02	0.02
	Bag Type Filters[1]	0.07	0.09	0.11	0.13	0.16
	Discharge Air Dampers (Fully Open)	0.13	0.17	0.21	0.25	0.30
	End Duct Connection	0.10	0.13	0.16	0.19	0.23
360		9600	10800	12000	13200	14400
	G400, G560 Gas Heat	0.02	0.03	0.03	0.04	0.05
	E040, 060, 080, 100, 120 Electric Heat	0.01	0.02	0.02	0.02	0.03
	Exhaust Air	0.02	0.03	0.03	0.04	0.05
	Economizer Return Air Damper for End Duct Connections	0.18	0.23	0.28	0.34	0.40
	Economizer Return Air Damper for Bottom Duct Connections	0.08	0.10	0.12	0.14	0.17
	2" 30% Efficient Filters[1]	0.01	0.01	0.01	0.02	0.02
	Bag Type Filters[1]	0.06	0.07	0.09	0.11	0.13
	Discharge Air Dampers (Fully Open)	0.19	0.24	0.30	0.35	0.40
	End Duct Connections	0.14	0.18	0.22	0.27	0.32
480		12800	14400	16000	17600	19200
	G560 Gas Heat	0.04	0.05	0.06	0.07	0.09
	G800 Gas Heat	0.05	0.06	0.08	0.10	0.12
	E040, 060, 080, 100, 120 Electric Heat	0.03	0.03	0.04	0.05	0.06
	Exhaust Air	0.03	0.04	0.05	0.06	0.07
	Economizer Return Air Damper for End Duct Connections	0.10	0.13	0.16	0.19	0.23
	Economizer Return Air Damper for Bottom Duct Connections	0.06	0.08	0.10	0.12	0.14
	2" 30% Efficient Filters[1]	0.01	0.01	0.01	0.02	0.02
	Bag Type Filters[1]	0.08	0.10	0.12	0.14	0.16
	Discharge Air Dampers (Fully Open)	0.24	0.30	0.35	0.41	0.48
	End Duct Connections	0.25	0.31	0.39	0.49	0.62

1 These resistances include a deduction for 2" throwaway or cleanable filters.
☐ Add these resistance values to the available static pressure shown in blower performance data table.

TABLE 11—SUPPLY AIR BLOWER PERFORMANCE*

MODEL DSV300

BLOWER RPM	CFM															
	7,500			9,000			10,500			12,000						
	BHP	kW		BHP	kW		BHP	kW		BHP	kW					
915[1]	0.94	4.17	3.86	0.67	4.82	4.41	0.35	5.54	4.95	–	–	–	–	–	–	
950	1.08	4.47	4.11	0.82	5.17	4.67	0.50	5.91	5.26	0.15	6.64	5.86	–	–	–	
1000	1.30	4.92	4.47	1.05	5.66	5.06	0.74	6.45	5.70	0.40	7.26	6.37	–	–	–	
1025[2]	1.41	5.15	4.65	1.17	5.92	5.26	0.86	6.73	5.93	0.53	7.57	6.63	0.13	8.53	7.45	
1050	1.52	5.40	4.85	1.29	6.18	5.48	0.99	7.02	6.17	0.66	7.90	6.91	0.27	8.85	7.74	
1100[3]	1.75	5.91	5.25	1.53	6.72	5.92	1.25	7.61	6.67	0.93	8.56	7.48	0.55	9.52	8.33	
1150	1.98	6.43	5.67	1.77	7.28	6.38	1.51	8.23	7.20	1.20	9.24	8.07	0.83	10.25	8.95	
1200	2.21	6.97	6.12	2.01	7.85	6.86	1.78	8.88	7.76	1.47	9.94	8.68	1.11	11.02	9.59	
1210[4]	2.25	7.08	6.20	2.06	7.96	6.97	1.83	9.01	7.87	1.53	10.08	8.79	1.17	11.19	9.75	
1250	2.44	7.53	6.59	2.26	8.43	7.36	2.05	9.55	8.35	1.75	10.66	9.30	–	–	–	

[1] Minimum speed for the 7-1/2 HP motor option.
[2] Minimum speed for the 10 HP motor option.
[3] Maximum speed for the 7-1/2 HP motor option.
[4] Maximum speed for the 10 HP motor option.

☐ 7-1/2 HP motor ☐ 10 HP motor

MODEL DSV360

BLOWER RPM	CFM														
	9,000			10,500			12,000			13,500					
	BHP	kW		BHP	kW		BHP	kW		BHP	kW				
780[1]	0.86	4.48	4.01	0.66	5.20	4.68	0.37	5.89	5.24	0.07	6.61	5.83	–	–	–
800	0.95	4.70	4.28	0.76	5.44	4.88	0.47	6.15	5.45	0.17	6.90	6.06	–	–	–
850	1.17	5.28	4.74	1.00	6.07	5.39	0.73	6.85	6.02	0.43	7.66	6.70	0.08	8.44	7.38
900	1.41	5.89	5.23	1.25	6.73	5.94	1.00	7.58	6.63	0.71	8.46	7.39	0.36	9.31	8.13
925[2]	1.54	6.20	5.49	1.38	7.07	6.31	1.14	7.95	6.95	0.85	8.87	7.75	0.51	9.76	8.52
940[3]	1.62	6.40	5.62	1.47	7.28	6.38	1.23	8.18	7.15	0.94	9.13	7.96	0.60	10.03	8.74
950	1.67	6.53	5.76	1.52	7.42	6.51	1.28	8.34	7.28	1.00	9.30	8.12	0.66	10.22	8.91
1000	1.94	7.20	6.33	1.80	8.14	7.11	1.57	9.13	7.96	1.30	10.18	8.88	0.96	11.17	9.74
1050	2.22	7.90	6.92	2.08	8.89	7.76	1.86	9.95	8.67	1.61	11.10	9.68	1.28	12.16	10.63
1100	2.50	8.63	7.54	2.36	9.67	8.43	2.16	10.80	9.42	1.92	12.06	10.53	1.60	13.19	11.55
1115[4]	2.58	8.86	7.74	2.44	9.91	8.63	2.25	11.06	9.64	2.02	12.35	10.80	1.70	13.51	11.83
1150	2.78	9.40	8.20	2.64	10.49	9.15	2.46	11.69	10.20	2.24	13.06	11.42	1.94	14.27	12.50
1200	3.06	10.21	8.90	2.92	11.35	9.90	2.76	12.62	11.02	2.57	14.10	12.36	2.29	15.40	13.48

[1] Minimum speed for the 10 HP motor option.
[2] Minimum speed for the 15 HP motor option.
[3] Maximum speed for the 10 HP motor option.
[4] Maximum speed for the 15 HP motor option.

☐ 10 HP motor ☐ 15 HP motor

MODEL DSV480

BLOWER RANGE	CFM														
	13,500			14,400			15,000			16,500					
	BHP	kW		BHP	kW		BHP	kW		BHP	kW				
925[1]	1.29	9.22	8.07	0.91	10.56	9.24	0.43	12.35	10.81	–	–	–	–	–	–
950	1.44	9.66	8.45	1.06	11.01	9.63	0.59	12.82	11.22	0.07	14.47	12.66	–	–	–
1000	1.74	10.56	9.24	1.36	11.94	10.45	0.90	13.78	12.06	0.39	15.45	13.52	–	–	–
1050	2.04	11.50	10.06	1.69	12.91	11.30	1.24	14.78	12.93	0.74	16.47	14.41	0.27	18.45	16.14
1100	2.35	12.49	10.93	2.02	13.93	12.19	1.58	15.83	13.85	1.09	17.54	15.35	0.53	19.51	17.07
1115[2]	2.44	12.80	11.20	2.12	14.24	12.46	1.68	16.15	14.13	1.20	17.86	15.63	0.64	19.84	17.36
1150	2.67	13.53	11.84	2.36	15.00	13.13	1.93	16.93	14.81	1.45	18.66	16.33	0.90	20.64	18.06
1190[3]	2.92	14.40	12.60	2.63	15.89	13.90	2.21	17.85	15.62	1.74	19.59	17.14	1.19	21.58	18.88
1200	2.99	14.63	12.80	2.70	16.13	14.11	2.28	18.09	15.83	1.81	19.84	17.36	1.27	21.84	19.11

[1] Minimum speed for the 15 HP motor option.
[2] Maximum speed for the 15 HP motor option.
[3] Speed for the non adjustable drive of the 20 HP motor option.

☐ 15 HP motor ☐ 20 HP motor

START-UP

PRE START-UP CHECKS

WARNING: Jumper wire "J21", (refer to Elementary Wiring Diagram), was intentionally disconnected and taped at the factory. This is done to prevent blower motor operation and compressor operation before proper pre start-up steps have been performed.

Do not connect "J21" or complete installation of day-night switch "12-SW" to terminal 119 until pre start-up steps have been performed.

PRE-START STEPS AND PROCEDURES:

Before starting the unit the following check list should be completed:

1. Make sure the available power supply and unit nameplate data agree.
2. Make sure all air filters are properly installed in filter racks.
3. Turn on power to unit:

   If a disconnect switch is installed outside the unit, turn it to "ON". The non-fused disconnect (optional) located in the unit's main supply panel must also be turned "ON".

CAUTION: Do not attempt to start the compressors without at least 8 hours of crankcase heat or compressor damage will occur.

4. Check operation of the various damper systems:

   a. Air volume dampers - refer to paragraph on "Air Volume Dampers" – ("Air Volume Control System").

   NOTE: Stop air volume dampers in "open" position.

   b. Economizer dampers - refer to paragraph on "Economizer System" – ("Damper Linkage Adjustment").

   c. Exhaust air system - refer to paragraph on "Exhaust Air System".

WARNING: It is important that all panels are fully secured with latches and screws before unit is started.

Be sure that the static pressure control accessory is installed and ready to regulate the static pressure in the duct system, before starting the unit blower.

Additional information regarding installation and adjustment of the static pressure regulator accessory is provided in the accessory instruction Form 530.25-N2.1.

CAUTION: Do not start the unit blower until the VAV duct system supply air boxes have been opened. Adjust the duct air boxes to the fully open position, using the box thermostats.

5. Make sure the proper clearances were considered.
6. Make sure all foreign matter has been removed from the interior of the unit (tools, construction or shipping materials).
7. Rotate all fans and blower wheels manually to check for free rotation.
8. Check belt tensions and alignment.
9. Make sure all wiring connections are tight.
10. Make sure the fuse sizes and the power wire are properly sized.
11. Make sure all controls are set at their proper set points.
12. Make sure condensate drain line is trapped per instructions as indicated with Figure 4.
13. For shipping, the compressor hold-down nuts are tightened, drawing the mounting feet down to the shipping stops. After the unit is in its final position, the four hold-down nuts must be removed to insert the rubber grommets found in the small parts bag. Replace the hold-down nuts and tighten until they start to compress the isolator springs and then give them an additional half turn.

INITIAL START-UP CHECKS

WARNING: Be sure air volume dampers are open and unit panels are secured. Check to be sure that building VAV supply air boxes are open and that crankcase heaters have been on for at least 8 hours.

1. To start blower and compressor connect the loose end of jumper "J21" to transformer "2T" in the main control box. Jumper "J21" is marked with a red tag. If the day-night accessory switch "12-SW" is used; closing the "day" circuit between terminals 119 and 133 will start the unit.

   NOTE: When a day-night switch "12-SW" is used, remove and discard jumper "J21".

   Check 3 phase blower motor rotation. If rotation is incorrect, reverse any two leads on the motor.

2. Check the dial settings on W7100 discharge air control in main control box. The initial factory settings are:

   a. Set point – 55°F
   b. Control band – 8°F
   c. Reset – Not applicable to York unit.

NOTE: Consult system designer for more detailed information regarding the above setpoints.

3. The proper supply air CFM should be established at this time with an inclined manometer as outlined in this instruction. This is an important part of the start-up procedure since it directly affects nuisance trip-outs on unit safety controls, condensate water blow-off from the evaporator coil, bearing and shaft damage, noise and vibration.

4. With an ammeter, check the compressor and the supply air blower amps to make sure they agree with the unit data plate.

5. After approximately 15 minutes of operation, check the liquid line sight glasses for a proper liquid refrigerant seal in each of the refrigerant circuit(s).

6. Refer to the heating instruction for the correct heating sequence of operation.

7. In conjunction with the HVAC system designer, pneumatic control contractor and qualified VAV balancing technician, the variable air volume system must be balanced to meet the builders specifications.

   Only qualified and trained personnel that are knowledgeable on VAV system balancing should balance or supervise balancing of the VAV system.

   The unit static pressure control must be adjusted to meet the VAV system requirements. Adjustment of the blower motor variable pitch pulley may also be required to meet VAV system requirements.

All other requirements specified by the variable air volume system designer must be satisfied during unit start-up and VAV system balancing phases.

Proper testing and balancing not only insure that HVAC systems meet design and comfort requirements but also save energy, cut operating costs and reduce maintenance requirements.

SAFETY AND SERVICE FEATURES

The control circuit includes the following safety features:

1. The supply air blower motor is protected with manual reset starter overload protectors.

2. The condenser fan motors have inherent protection with automatic reset.

3. The primary winding of transformer 1T is protected by fuse 12FU. The secondary winding and the 115 volt control circuit are protected by fuse 13FU.

4. All safety controls in the 115 volt circuit have the "return" or "common" side of the 1T transformer grounded. Fuse 13FU will "BLOW" whenever a dangerous condition occurs. The unit casing is also grounded.

5. The wiring to each compressor motor, each condenser fan motor and the supply air blower motor are individually fused according to the National Electrical Standards.

6. The compressor(s) are protected by a 100 watt immersion type crankcase heater(s). Heater(s) are energized whenever power is supplied to the unit. When the compressor(s) are energized, the heater(s) are turned off.

CAUTION: Do not attempt to start the compressors without at least 8 hours of crankcase heat or compressor damage will occur.

7. Each refrigeration system has a low pressure cutout (1LP for system No. 1 and 2LP for system No. 2) to shut down the compressor due to loss of refrigerant charge or a build up of frozen condensate on the compressor before the suction valve and are set to open when the suction pressure drops to 7 psig. These controls will automatically reset when the suction pressures rise to 22 psig. The opening of the low pressure cutouts will activate the lockout circuit.

8. High pressure cutouts (1HP for system No. 1 and 2HP for system No. 2) are located in each system on the compressor before the discharge valve. Should a system discharge pressure exceed 398 psig, the control will open and de-energize the compressor. The pressure cutout will close when the discharge pressure drops to 310 psig. The opening of the high pressure cutout will activate the lockout circuit. The high pressure cutouts may open due to a dirty or restricted condenser coil, loss of air flow or too high an ambient air temperature.

9. The lockout circuits mentioned above will not be energized during normal operation because they have a high resistance. The flow of electricity will normally follow the path of least resistance through the compressor contactors 1M and 2M. If, however, a low or high pressure cutout opens, the lockout relay 10R or 11R will be energized. Since the voltage across 10R or 11R will exceed 100V, the voltage across 1M or 2M will be too low to pull in the contactors. The normally closed contacts of 10R or 11R will open the circuit in series with the low or high pressure cutout. When these contacts automatically close, the lockout circuit can be reset by interrupting the power to the unit.

   Two advantages are gained by this circuit:

   a. Prevents rapid cycling of the compressors which can be damaging.

   b. The alternate use of manual reset cutoffs avoids the problem above but may require an expensive service call to reset these controls.

10. Freezestat 3TH senses the suction temperature of the No. 1 system and will shut down compressor(s) when this temperature drops to 32°F. It will reset automatically at 37°F.

11. The supply air flow must be proven by vacuum switch 5LP. In the event the belts on the supply air motor break or the supply air motor should be de-energized by its overload protectors, 5LP will open and interrupt the cooling, heating and economizer control circuits. This assures that the various modes of operation do not continue without proper air flow.

12. The compressor motor protector(s), 1MP, 2MP will interrupt the compressor control circuit when sensing an overload condition. Also an anti-recycle timer is part of this device to prevent the compressor from rapid cycling. The compressor will stay off for five minutes. It also monitors the voltage of the 120 volt control circuit and will shut down the compressor if the voltage drops below 85 ± 4.5 volts.

13. Oil pressure control switches are installed in the compressor circuits. These assure that adequate oil pressure is present to lubricate the moving parts of the compressor. If pressure is not adequate, the switch opens shutting down the compressor. It is manually reset.

14. When the pumpdown accessory, Model 2PD04700101, is installed, the compressor will continue to operate through contact 12TR-2 after the room thermostat or controller is satisfied. Solenoid 3SOL in the liquid line is now closed and the compressor pumps most of the refrigerant out of the evaporator to the high side of the system. The system suction pressure drops until the low pressure cutoff (1LP) opens. This will shut down the compressor and de-energizes the 12TR relay which opens 12TR-2 to put the operation of the compressor under the control of the 1R relay. Also present is a 12TR-1 contact which is closed when the system is off and provides a bypass circuit to allow contactors 1M and 2M to be activated in the event the low pressure cutout has not reset. Without this pumpdown circuit, it is possible to have the oil pressure switch (OP/PS) open on light load and short cycle of the compressor. Refrigerant floods back to the compressor on each start-up, foams the oil in the compressor crankcase and pumps the oil to the condensate coil. The run times are too short to bring the oil back to the compressor so that eventually the oil pressure switch opens. This requires re-setting manually at the unit.

MAINTENANCE

FILTERS

The filters must be replaced as often as necessary to assure good air flow and filtering action.

Refer to Figure 1 for filter access location.

COILS

Do not allow dirt to accumulate on the evaporator and condenser coil or other parts of the evaporator and condenser circuit. Clean as often as necessary to assure good system performance. Use a brush, vacuum cleaner attachment or other suitable means.

DRAIN PAN

The drain pan should be inspected regularly to assure proper drainage.

LUBRICATION

The bearings for the blower shaft and the blower motor are not permanently lubricated. They do require periodic lubrication.

BELTS

Maintain belt tension to extend belt life. Replace when signs of failure begin to appear.

REFRIGERANT CHARGE R-22

D-SV300	D-SV360	D-SV480
36 lbs., 0 oz.	40 lbs., 8 oz.	29 lbs., 8 oz. each system.

Subject to change without notice. Printed in U.S.A. CPC 1M 990 1.20 Code: SBY 530.25-N2Y

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