



# INSTALLATION, OPERATION, & MAINTANANCE MANUAL

## FT2448-3-AL-MD

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# CHAPTER 1



# HALCO PRODUCTS COMPANY

100 N. Gordon Street - Elk Grove Village, IL 60007-1193

Tel: 847-956-1600 - Fax: 847-956-0595

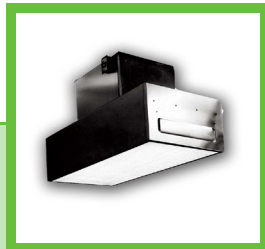
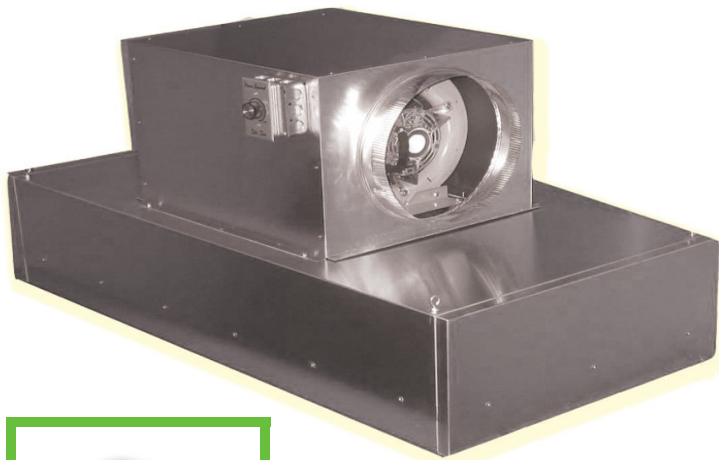
E-Mail: Info@Halco-Products.com

Website: www.Halco-Products.com



## HALCO FT24-M SELF CONTAINED SUSPENDED FILTER MODULE

**FOR POSITIVE CLEAN AIR RESULTS**



**FT Blower  
With Lights  
Also Available!**

**HALCO** Ceiling Modules fit all standard 2' x 4' T-Bar systems. All units are factory sealed and certified, ready for installation. Modules are supplied with a HEPA Filter. Pack sizes 2", 3" & other sizes. Optional 3" separator-less" filter is also available for compact installation applications.

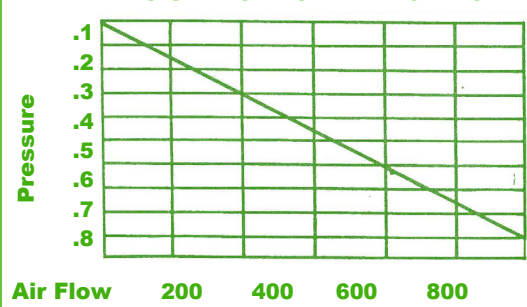
### FT24-M CEILING MODULE

The FT24-M has a self-contained 1/3 H.P. direct drive motor blower. Units may be hung free style or be used to overcome any pressure drop problems which may occur within your existing air system.

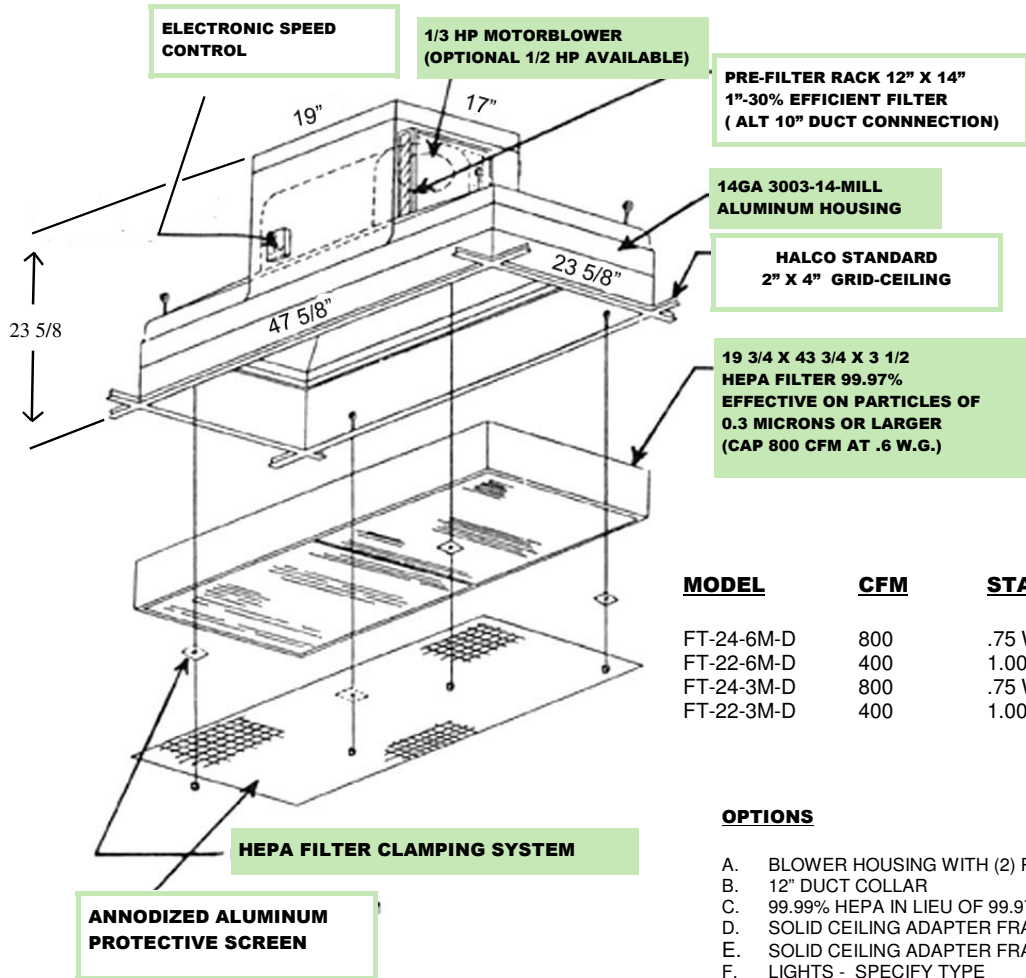
#### CLEANROOM STANDARDS

ISO	FED. STANDARD 209E		PART./CUBIC METER (P/M3)	
	ENGLISH	METRIC	0.5UM	5.0UM
1				
2			4	
3	1	M1.5	35	
4	10	M2.5	352	
5	100	M3.5	3,520	29
6	1000	M4.5	35,200	293
7	10,000	M5.6	35,200	2,930
8	100,000	M6.5	352,000	29,300
9			35,200,000	293,000

#### INITIAL RESISTANCE VS. AIR FLOW - CFM



# SPECIFICATIONS



**\*NOTE.** HEPA FILTER IS REPLACED FROM BELOW WITHOUT DISTURBING T-GRID CEILING OR MODULE HOUSING

<b>MODEL</b>	<b>CFM</b>	<b>STATIC PRESS</b>
FT-24-6M-D	800	.75 W.G.
FT-22-6M-D	400	1.00 W.G.
FT-24-3M-D	800	.75 W.G.
FT-22-3M-D	400	1.00 W.G.

### OPTIONS

- A. BLOWER HOUSING WITH (2) PRE FILTERS
- B. 12" DUCT COLLAR
- C. 99.99% HEPA IN LIEU OF 99.97%
- D. SOLID CEILING ADAPTER FRAME (2 X 4)
- E. SOLID CEILING ADAPTER FRAME (2 X 2)
- F. LIGHTS - SPECIFY TYPE
- G. OPTIONAL VOLTAGE
- H. VARIABLE SPEED CONTROL
- I. GEL SEAL HEPA
- J. CHALLENGE PORTS
- K. INSULATED HOUSING



## HALCO PRODUCTS COMPANY

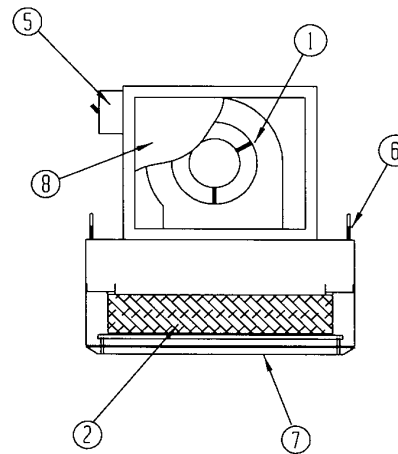
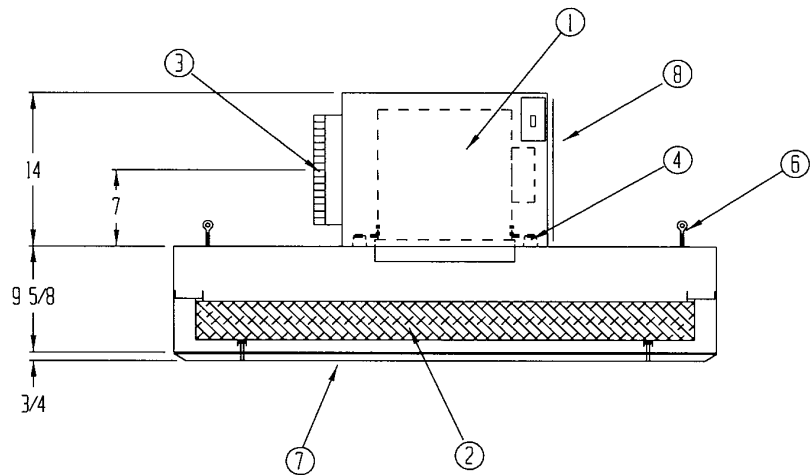
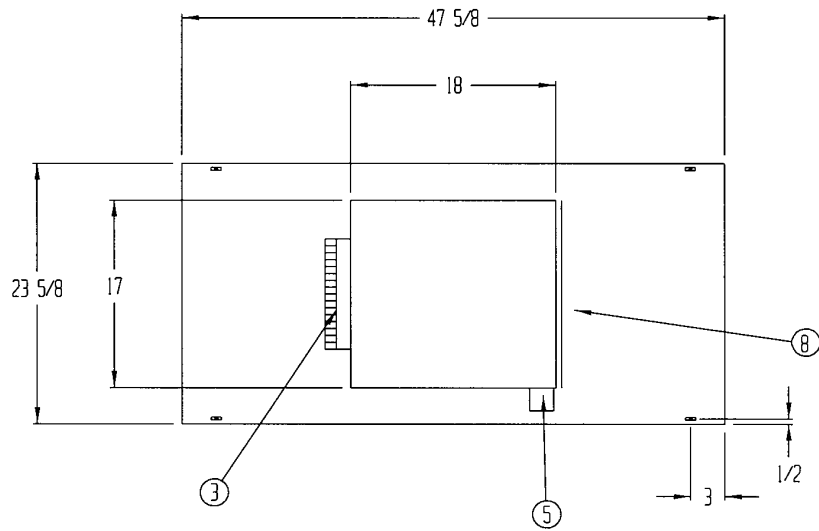
100 N. Gordon Street - Elk Grove Village, IL 60007-1193  
 Tel: 847-956-1600 - Fax: 847-956-0595  
 E-Mail: Info@Halco-Products.com  
 Website: www.Halco-Products.com

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED

NOTE:

- HEPA FILTER REPLACED FROM BELOW WITHOUT DISTURBING CEILING OR HOUSING
- ELECTRICAL WIRING TO CONFORM TO LATEST NEC STANDARDS
- UNIT TO MEET ISO STANDARD 14644-1 (FEDERAL STANDARD 209E)
- UNIT OPERATING WEIGHT 85 LBS.
- ELECTRICAL REQUIREMENTS: 115 VOLT, 60 HZ., 4.6 FLA

- ① 1 EA. 9-9AT DIRECT DRIVE BLOWER WITH 1/3 H.P. MOTOR. CAPABLE OF PRODUCING 800 CFM @ .55" INITIAL HEPA FILTER STATIC PRESSURE
- ② 1 EA. 19 3/4 X 43 3/4 X 3 1/2" ANODIZED ALUMINUM FRAMED HEPA FILTER, 99.99% EFFECTIVE ON PARTICLES OF 0.3 MICRONS AND LARGER - GASKET SEAL
- ③ 1 EA. 10" DIA STARTER COLLAR
- ④ 4 EA. MOTOR/BLOWER VIBRATION ISOLATORS
- ⑤ ELECTRONIC SPEED CONTROL
- ⑥ 4 EA. EYEBOLT HANGING SUPPORTS
- ⑦ ANODIZED ALUMINUM PROTECTIVE GRILLE WITH 1/8" DIA. HOLE ON 3/16" STAGGERED CENTERS PROVIDING AN OPEN AREA OF 40%.
- ⑧ MOTOR/BLOWER ACCESS PANEL

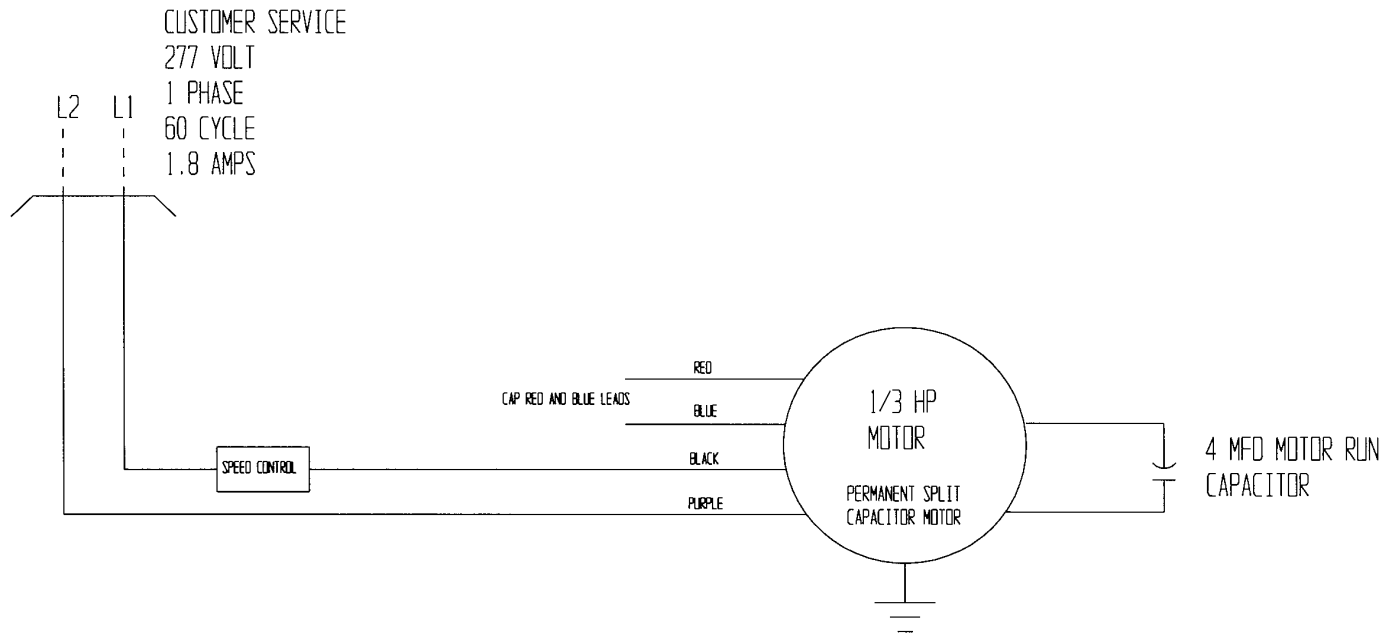


CONSTRUCTION:

- HOUSING CONSTRUCTED OF 0.063 THK. 3003-H14 MILL ALUMINUM
- ASSEMBLED WITH INSIDE TURNED FLANGES, CAULKED AND RIVETED

DRAWN FOR		<b>HALCO PRODUCTS CO.</b>		
STANDARD		100 NO. GORDON STREET - ELK GROVE, IL. 60007		
		TITLE FAN POWERED TERMINAL FILTER MODULE MODEL FT2448-MD/AL		
DRAWN BY	DK	SIZE	JOB NO. SG688	DWG NO. 1714163AO
APPROVED BY		SCALE	N/A	DATE 10/4/06
				REV
				SHEET

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED



DRAWN FOR		<b>HALCO PRODUCTS CO.</b> 100 NO. GORDON STREET ELK GROVE, IL. 60007	
		TITLE WIRING DIAGRAM MODEL FT2448-MD/MDD	
DRAWN BY	OK	SIZE	JOB NO. -----
		DWG NO.	2198158A
APPROVED BY		SCALE	N/A
		DATE	3/20/98
		SHEET	

# CHAPTER 2

## **IMPORTANT SAFETY INSTRUCTIONS**

### **READ AND SAVE THESE INSTRUCTIONS**

- Read all of the instructions before operating this equipment.
- Pay particular attention to all safety precautions.
- Retain the instructions for future reference.

### **WARNING- TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:**

- a) Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.
- b) Before servicing or cleaning unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.

### **WARNING- TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:**

- a) Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.
- b) Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment to prevent backdrafting. Follow the heating equipment manufacturer's guideline and safety standards such as those published by the National Fire Protection Association (NFPA), and the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), and the local code authorities.
- c) When cutting or drilling into wall or ceiling, do not damage electrical wiring and other hidden utilities.



This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the manual accompanying the unit.



## HEPA FILTER BLOWER MODULE

### INSTALLATION:

- Utilizing the ceiling wire, mount the module to upper structure supports and to eyebolts on module. (If applicable)
- To mount module in T-grid ceiling, remove "T" grid ceiling tile, gasket "T" grid with gasket provided and place filter/module into "T" grid ceiling.
- The electrical must meet the latest NEC codes. Remove the speed control from the junction box and run power supply to junction box, then replace speed control. Customer to supply electrical power source of 115 volt, 1 phase, 60 hertz. Manufacturer recommends a 15-amp service. Refer to the electrical tag on unit to verify proper voltage, hertz and amperage.
- Turn blower switch to "on" position.
- Allow unit to purge for at least 30 minutes.

### TESTING & RECERTIFICATION:

Unit to meet ISO standard 14644-1 classification of air cleanliness.

The manufacturer recommends that recertification of the unit should be performed on at least a yearly basis to assure that the unit is working at its optimum performance.

### GENERAL MAINTENANCE:

This model requires virtually no maintenance. The few elements, which do require attention, are readily accessible and take a minimum amount of time. Perform visual, electrical and mechanical inspections on a regular basis. This should be determined by the environment and frequency of use.



**WARNING:** Always disconnect primary power source before inspection or servicing unit.

### MOTOR/BLOWER ASSEMBLY:

Blowers are direct drive type and are selected for continuous operation. The blower bearings are sealed and maintenance is not required. All other bearings are permanently lubricated. Motor/blowers are accessible behind the motor/blower access panel. Inspect motor/blower assembly periodically (every 3-6 months) for dirt accumulations etc. For more details, refer to the Dayton Motor Installation and Maintenance Information enclosed in the literature section of this manual.

### HEPA FILTER:

The HEPA filter is capable of removing 99.99% of all particles 0.3 microns in size and larger. The average life of the HEPA filter is about two (2) to three (3) years, however, the life of the HEPA (or final) filter will depend on good prefilter maintenance and ambient conditions.

If the HEPA filter has an internal test port for DOP challenge to filter and seal to gain access to the test port, use a (Phillips) screwdriver to remove well nut. When testing is completed, replace well nut.

## HEPA FILTER BLOWER MODULE

### HEPA FILTER: (Cont'd)

Initially, the static pressure reading should be recorded. Should the pressure rise to twice the initial reading it is an indication that the HEPA filter is reaching its useful life. Periodically, check the static pressure reading. A more specific check is to periodically determine the airflow from the HEPA filter. Initially this will average 90 f.p.m. @ 6" from face of filter, +/-20 f.p.m, should the airflow drop to below 70 f.p.m, with the speed control on high; this would be an indication that the HEPA filter requires changing.

### HEPA FILTER REPLACEMENT:

The HEPA filter is replaced through the air discharges grille from inside the cleanroom. To change the HEPA filter:

- Disconnect the module from the electrical power source.
- Remove the protective grille for access to the HEPA filter.
- Loosen and remove the HEPA filter holding devices.
- Remove old HEPA filter and discard.
- To install new HEPA filter, reverse process being careful not to damage the new HEPA filter and securing holding plates tightly.
- Replace the perforated grille and hand-tighten the T-nuts. **(Do not over-tighten the T-nuts)**

**Note:** The HEPA filter media is easily damaged please remember to handle the HEPA filters carefully!

### PARTS LIST ▪ MODEL# FT2448- MD/AL

PARTS DESCRIPTION	PART NO.	MFG.	QTY
Blower 9/9AT	DD99AT	LAU	1
Motor 1/3 HP	3LU79	Dayton	1
Capacitor	97F9001BX/6X655	GE	1
Speed Control (5.0Amps)	KBWC-15K	KB Electronics	1
HEPA Filter 99.99% effy. On particles 0.3 micron size and larger	H1943B66-BAABCAA	Halco	1 ♦
Starter Collar	10"	Acme	1

♦ MANUFACTURER RECOMMENDED STOCKING SPARE PARTS

♦ THE AVERAGE LIFE OF THE HEPA FILTER IS ABOUT TWO (2) TO THREE (3) YEARS, HOWEVER, THE LIFE OF THE HEPA (OR FINAL) FILTER WILL DEPEND ON GOOD PREFILTER MAINTENANCE AND AMBIENT CONDITIONS

# CHAPTER 3

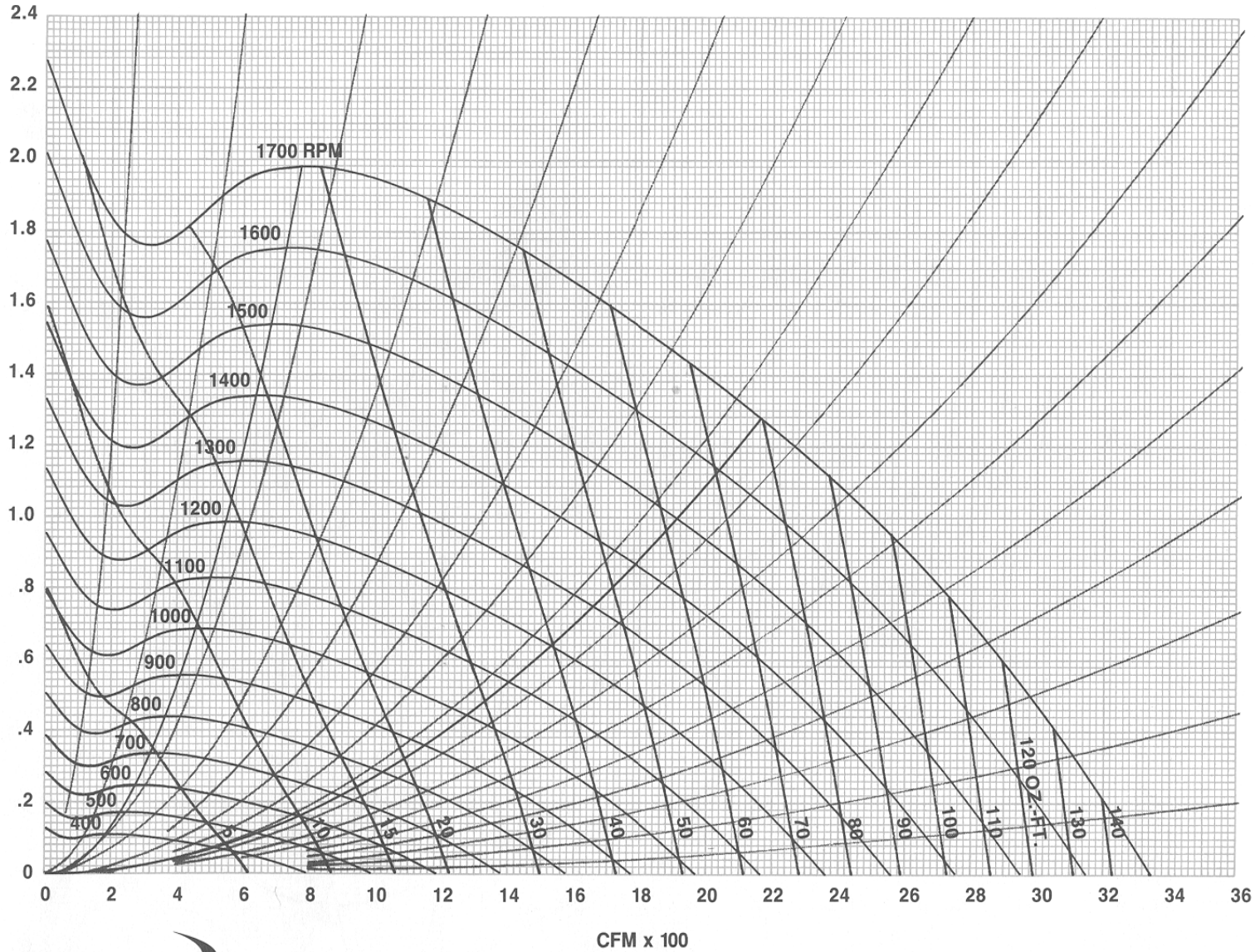
**DAILY FILTER TEST REPORT**

DATE: 01/14/08

SERIAL #	JOB #	CUSTOMER	FILTER CODE	OPER	EQUIP	CHALLENGE	SCALE	WIDTH	LENGTH	DEPTH	DP	MEDIA	FRAME	PPI	FACT	PRES	CFM	VEL	PRES	DAMAGE CODE	PASS	FAIL				
																							TEST	FILTER SIZE	PAK	PRES ACT
080114	7	SG688 HALCO PRODUCT	H1943B66-BAABCAA	JB	LASER	PSL	0.1	19.75	43.75	3.5	2.75	HEPA	3.5	6	1.18	0.26	482	90	0.306	LP	LF	CB	DP	DH	PASS	FAIL

DAMAGE CODE KEY
LP = Leak repaired on pleated edge of urethane seal
LF = Leak repaired on flat edge of urethane seal
CB = Leak repaired on center board urethane seal
DP = Damage repaired due to pleater or paper handling
DH = Damage repaired due to filter handling
< Highlighted areas indicate repair >

STATIC PRESSURE - INCHES WATER GAUGE



MODEL DD9-9AT



GRAPH NO. G2769-1  
 DATE 2-15-95  
 WHEEL DIA. 9.50  
 WHEEL WIDTH 9.50  
 OUTLET AREA .83  
 (Square Feet)

Performance curves based on test made in accordance with ASHRAE 51-1985, AMCA 210-85. Tested without inlet duct and with discharge duct. Brake horsepower does not include drive losses. Standard Air Density 0.075 lb./cu. ft.

$$SE = \frac{CFM \times SP}{6362 \times BHP}$$

$$BHP = \frac{RPM \times (oz. ft.)}{84034}$$

SEE SPECIFICATION DATA SHEET 329 FOR OPERATIONAL LIMITS.



# Specification Sheet "DD-T" Series Wheel & Housing

Tight Scroll

Number: **329** Date: **2-15-95**

SHEET 1 OF 1

## NOTES:

Shaded areas indicate Lau preferred product. Selections in non-shaded areas and optional features may affect price and availability.

Product weights may vary with bore size and hub style.

Solid style hubs with bores up to 3/4" are available for most diameters. (Ref. spec sheet #500)

Wheel Moment of Inertia may vary with bore size and hub style:  
 $wk^2 / 32.2 = (\text{Lb-Ft-Sec}^2)$

Blast Area =  $(M/E) \cdot (\text{outlet area})$

Dimensions shown for reference only. For certified product dimensions contact Lau Engineering.

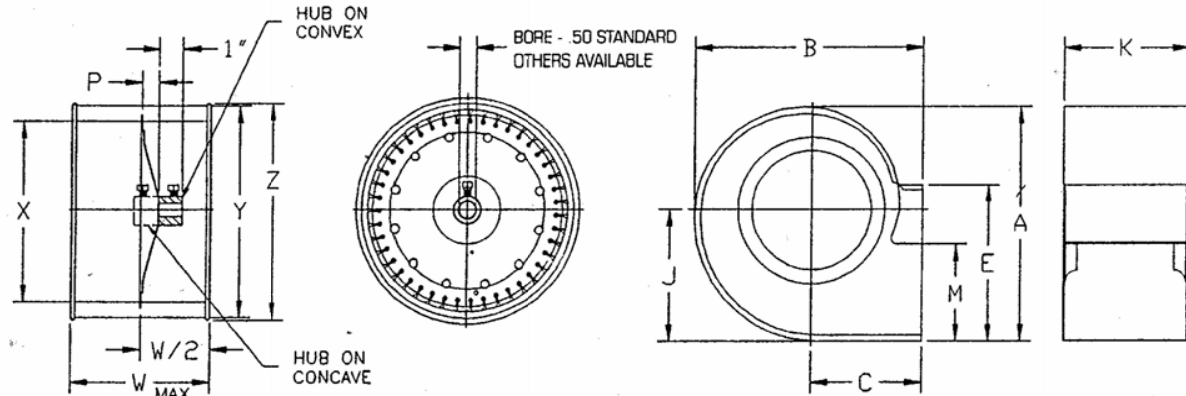
Contact Lau Engineering for application assistance.

Outlet Velocity:  $\text{FPM} = \text{CFM}/\text{O.A.}$

Model	MAX RPM
9"	1750
10"	1750
12"	1200

DIMENSIONS IN INCHES

Model	A	B	C	E	J	K	M	P	Wheel Dimensions				O.A. Sq. ft	WK <sup>2</sup> lb.-ft. <sup>2</sup>	No. of Blades	Hub Location	Wheel Wt. (lbs)	Unit Weight
									W	X	Y	Z						
DD9-4AT	12.81	12.53	6.12	10.25	7.19	6.81	5.25	.78	4.50	7.69	9.50	9.94	.48	.33	43	CONVEX	3.4	8.2
DD9-6AT	12.81	12.53	6.12	10.25	7.19	8.25	6.12	.78	6.00	7.69	9.50	9.94	.58	.35	43	CONVEX	3.9	8.8
DD9-7A T	12.81	12.53	6.12	10.25	7.19	9.19	6.12	.78	7.12	7.69	9.50	9.94	.65	.42	43	CONVEX	4.5	10.6
DD9-8A T	12.81	12.53	6.12	10.25	7.19	10.50	6.12	.78	8.00	7.69	9.50	9.94	.75	.47	43	CONVEX	4.9	11.0
DD9-9AT	12.81	12.53	6.12	10.25	7.19	11.81	6.12	.78	9.50	7.69	9.50	9.94	.83	.56	43	CONCAVE	5.4	13.1
DD9-10AT	12.81	12.53	6.12	10.25	7.19	13.12	6.12	.78	10.62	7.69	9.50	9.94	.93	.59	43	CONCAVE	5.9	14.0
DD10-4AT	15.38	15.00	7.31	11.38	8.84	6.81	6.00	.95	4.50	8.88	10.62	11.12	.53	.50	48	CONVEX	3.8	9.5
DD10-6AT	15.38	15.00	7.31	11.38	8.84	8.25	7.00	.95	6.00	8.88	10.62	11.12	.65	.51	48	CONVEX	4.3	10.4
DD10-7AT	15.38	15.00	7.31	11.38	8.84	9.69	7.00	.95	7.12	8.88	10.62	11.12	.77	.65	48	CONVEX	4.9	11.3
DD10-8AT	15.38	15.00	7.31	11.38	8.84	10.50	7.00	.95	8.00	8.88	10.62	11.12	.81	.73	48	CONVEX	5.4	12.3
DD10-9AT	15.38	15.00	7.31	11.38	8.84	11.81	7.00	.95	9.50	8.88	10.62	11.12	.97	.77	48	CONCAVE	6.2	13.6
DD10-10AT	15.38	15.00	7.31	11.38	8.84	13.12	7.00	.95	10.62	8.88	10.62	11.12	1.02	.91	48	CONCAVE	6.8	15.3
DD11-4AT	17.47	16.84	8.03	13.62	10.03	6.81	7.31	1.00	4.50	10.02	11.75	12.25	.65	.74	53	CONVEX	4.2	12.3
DD11-6AT	17.47	16.84	8.03	13.62	10.03	8.25	7.31	1.00	6.00	10.02	11.75	12.25	.78	.88	53	CONVEX	5.0	13.9
DD11-7AT	17.47	16.84	8.03	13.62	10.03	9.44	7.31	1.00	7.12	10.02	11.75	12.25	.89	1.00	53	CONVEX	5.7	14.7
DD11-8AT	17.47	16.84	8.03	13.62	10.03	10.50	7.31	1.00	8.00	10.02	11.75	12.25	.99	1.02	53	CONVEX	5.8	15.5
DD11-9AT	17.47	16.84	8.03	13.62	10.03	11.81	7.31	1.00	9.50	10.02	11.75	12.25	1.11	1.16	53	CONCAVE	6.5	17.5
DD11-10AT	17.47	16.84	8.03	13.62	10.03	13.12	7.31	1.00	10.62	10.02	11.75	12.25	1.24	1.29	53	CONCAVE	7.3	19.7
DD12-6AT	17.47	16.84	8.03	13.62	10.03	8.81	7.31	1.00	6.00	10.31	12.62	13.19	.83	1.09	43	CONVEX	6.1	15.0
DD12-8AT	17.47	16.84	8.03	13.62	10.03	10.75	7.31	1.00	8.00	10.31	12.62	13.19	1.02	1.18	43	CONVEX	6.6	16.3
DD12-9AT	17.47	16.84	8.03	13.62	10.03	12.25	7.31	1.00	9.50	10.31	12.62	13.19	1.16	1.25	43	CONVEX	7.0	17.2
DD12-11AT	17.47	16.84	8.03	13.62	10.03	13.88	7.31	1.00	11.12	10.31	12.62	13.19	1.31	1.60	43	CONCAVE	9.0	20.1
DD12-12AT	17.47	16.84	8.03	13.62	10.03	15.62	7.31	1.00	12.62	10.31	12.62	13.19	1.48	1.75	43	CONCAVE	9.9	21.3



### Motor, 1/3 HP, Direct

Direct Drive Blower Motor, HP 1/3, Voltage 115V, Nameplate Speed 1075 RPM, Full Load Current 4.6 Amp, Number of Speeds 4, Enclosure Open Air Over, Motor Type PSC, Mounting Ring/Stud/Hole, Rotation CW/CCW, Shaft Dimension 1/2 x 6 Inches, Thermal Protection Auto, Frame 48YZ, Ring to Ring Center 5 3/8 Inches, Length Less Shaft 5 7/8 Inches, Capacitor Required 6X655



### TECHNICAL SPECIFICATIONS

<b>Application</b>	High Efficiency Performance on Furnace Blowers, Shaft-mounted Fan and Blower Equipment
<b>HP</b>	1/3
<b>Volts</b>	115
<b>Nameplate RPM</b>	1075
<b>Full Load Amps</b>	4.6
<b>Number of Speeds</b>	4
<b>Enclosure</b>	OPAO
<b>Motor Type</b>	PSC
<b>Mounting</b>	Universal
<b>Rotation</b>	CW/CCW
<b>Shaft Dimensions (In.)</b>	1/2 x 6
<b>NEMA/IEC Frame</b>	48YZ
<b>Ring to Ring Center (In.)</b>	5 3/8
<b>Length Less Shaft (In.)</b>	5 7/8
<b>Capacitor Required</b>	6X655
<b>Service Factor</b>	1.0
<b>Thermal Protection</b>	Auto
<b>Bearings</b>	All-angle Sleeve
<b>Ambient (°C)</b>	40
<b>Body Dia. (In.)</b>	5 5/8
<b>Insulation Class</b>	A

# Dayton Permanent Split Capacitor (PSC) and Shaded Pole (SP) Fan and Blower Motors

E  
N  
G  
L  
I  
S  
H

## Motor Installation and Maintenance Information

*Please read and save these instructions.  
Read carefully before attempting to assemble,  
install, operate or maintain the product described.  
Protect yourself and others by observing all safety  
information. Failure to comply with instructions  
could result in personal injury and/or property  
damage! Retain instructions for future reference.*

**Dayton**<sup>®</sup>



## Initial Inspection and Handling

- After opening carton, look for concealed damage. If concealed damage is found, immediately file claim with carrier.
- Check the nameplate to verify that data conforms to specifications of motor ordered.

**⚠ DANGER** *High voltage and moving parts around motors and motor driven equipment can cause serious or fatal injuries. Always disconnect power source before working on a motor or its connected load. Installation must conform to all OSHA requirements and the National Electrical Code (NEC) in the United States, and all local codes.*

**Electrical** – Motor must be securely and adequately grounded by wiring with a grounded metallic conduit, or other grounding method approved by the NEC and local codes.

Insulate all connections carefully to prevent grounding or short circuits. Reinstall all conduit and terminal box covers. Do not force connections into the conduit box.

**Thermal Protection** – Use thermally protected motors or a motor starter incorporating thermal overload protection wherever required by safety regulations such as NEC or Underwriters Laboratories (UL) Standards in the United States; or where overloading, jamming or other abnormal operating conditions may occur. Under low temperature conditions, manual reset protectors may reset automatically, causing motor to start unexpectedly. **Always disconnect power before working on equipment.**

**Mechanical** – **Guard all moving parts.** Remove the shaft key before running the motor without a connected load. Be careful when touching the exterior of an operating motor! Motor may be hot enough to be painful or cause injury. This condition is normal for most motors when operated at rated load and voltage. Do not use the motor in a hazardous location as defined by Article 500 of the National Electrical Code (NEC).

**Storage** – Motor should be stored indoors in a clean, dry location.

## Location

- **Open, Dripproof Motor** – Clean dry locations with access to an adequate supply of cooling air.
- **Totally Enclosed Motor** – Harsher environments where damp and dirty conditions may exist. Totally enclosed motors are not water-proof.
- Use only UL listed **Hazardous Location** motors for service in **Hazardous Locations** as defined in Article 500 of the NEC.
- Temperature around the motor should not exceed 104°F (40°C). Minimum temperature is -20°F (-29°C).
- If the motor nameplate indicates "Air-Over, Cont. A.O.," etc., the motor must be mounted in the air stream of an air moving device.

**⚠ CAUTION** *Not for fans in unattended areas. Refer to the following for proper thermal protection, and other motor selection information.*

### **UL 507 STANDARD – FANS FOR USE IN UNATTENDED AREAS (PARAGRAPHS 125 & 126)**

Any motor used in a fan product, such as bathroom exhaust fans, wall-insert fans, ceiling-insert fans, attic exhaust fans, whole house fans and duct fans, etc., which are built into or within the building structure and which are likely to operate unattended or in situations in which the operator may not detect a locked rotor (stalled motor) condition must have either a manual reset thermal protector or a thermal cut-off (one-shot) device. Rangehoods, circulating fans, pedestal fans and ceiling suspended fans are **not** included. Agricultural fans are included, if they are built into the building structure and are likely to

operate unattended or in situations in which the person operating the fan may not detect a locked rotor (stalled motor) condition.

**Power Source**

- Voltage, frequency and phase of the power supply must correspond to that shown on the motor nameplate. Low voltage can reduce performance and cause overheating.
- A 208 volt system requires a motor rated at 200 or 208 volts.

**Motor Control Devices**

- Use of a suitable motor starting device is advisable and usually required by local electrical codes.
- Supply lines must have fuses to provide short circuit protection for the motor and controller.
- Any switching device used to control motor must have a horsepower rating equal to or greater than the motor.
- Use of an electronic adjustable speed control is **not recommended** unless the motor has been specifically designed for such applications.

**Motor Mounting**

Motor must be securely fastened to prevent vibration and minimize noise. For secure mounting use high-quality bolts of the largest possible diameter.

Where possible, sleeve bearing motors should be mounted with oil ports up and accessible.

Some condenser fan motors have condensate drain plugs on both endshields. Depending upon mounting position, one or both plugs must be removed.

Direct-coupled installations require a careful check of shaft and coupling alignment. Shim motor base as necessary. Do not depend on a flexible coupling to compensate for misalignment.

**Connecting Power to Motor**

To connect motor for proper voltage and rotation, refer to the connection diagram on the nameplate or inside the terminal/conduit box.

**Minimum Wire Sizes for Shaded Pole and PSC Motors**

Motor HP	— 25 Feet —		— 50 Feet —		— 100 Feet —		— 150 Feet —		— 200 Feet —	
	115V	230V	115V	230V	115V	230V	115V	230V	115V	230V
1/12	14(18)*	14(18)*	14(18)*	14(18)*	14	14(18)*	14	14(18)*	12	14(18)*
1/10	14(18)*	14(18)*	14(18)*	14(18)*	14	14(18)*	12	14(18)*	12	14(18)*
1/8	14(18)*	14(18)*	14(16)*	14(18)*	14	14(18)*	12	14(18)*	10	14(16)*
1/6	14(18)*	14(18)*	14(16)*	14(18)*	14	14(18)*	12	14(18)*	10	14(16)*
1/5	14(18)*	14(18)*	14(16)*	14(18)*	12	14(18)*	12	14(18)*	10	14(16)*
1/4	14(18)*	14(18)*	14	14(18)*	12	14(18)*	10	14(18)*	8	14
1/3	14(16)*	14(18)*	14	14(18)*	10	14(16)*	10	14(16)*	8	14
1/2	14(16)*	14(18)*	14	14(18)*	10	14(10)*	8	14	8	14
3/4	14	14(18)*	12	14(18)*	8	14	6	12	6	12
1	14	14(18)*	10	14(16)*	8	14	6	12	4	10
1½	12	14(18)*	10	14(16)*	6	14	4	10	4	10

**NOTE:**

- NEC Article 310-5 — Minimum conductor size for general wiring at 115-440VAC is No. 14AWG.
- Above wire sizes based on approximate 5% voltage drop during starting; copper conductors; and 75°C type THHW, THW, THWN, RH, RHW insulation, etc. For aluminum wire, increase two wire size steps minimum. See NEC Article 310 for ampacities of aluminum conductors.

\* Type S, SO, SJ, SJO, etc. Flexible cable wire sizes. See NEC Article 400 for ampacity.

**⚠ WARNING** *All aspects of the installation must conform to the requirements of the NEC, including Article 430*

*(Motor Circuits and Controllers), and all local codes. Wherever possible, each motor should be powered from a separate circuit of adequate capacity to keep voltage drop to a minimum during starting and running. Increase wire size where motor is located a distance from the power source. Wire size must be adequate to minimize voltage drop during starting and running. Refer to Minimum Wire Size Table for suggested wire sizes. Distances shown are one-way between source and motor. Portable cords, if used, should be as short as possible to minimize voltage drop. Long or inadequately sized cords, especially on hard starting loads, can cause motor failure. All electrical connections in system must be secure to prevent voltage drop and localized heating.*

- Determine direction of rotation before connecting driven equipment to prevent damage.
- To prevent bearing damage, do not strike shafts with hammer or other tool.
- If the motor has been damp or wet, then have motor serviced by a qualified motor repair shop before operating.

On multi-speed motors insulate the unused leads separately.

**Connection of power to two of the speed leads (eg. high and low) simultaneously will burn out the motor.**

On PSC motors, make sure the motor run capacitor rating matches the capacitor rating on the motor nameplate. When replacing an existing motor, the capacitor should also be replaced.

### **Starting Motor**

**Be sure motor is properly grounded.**

Connect motor to load and run briefly. Check for unusual noises and vibration (see Troubleshooting). Check motor current; it should be close to nameplate. Visually re-inspect the installation. Make sure that the guards and other protective devices are securely in place. All covers and gaskets must be re-installed to minimize the entry of dirt and moisture.

### **Multi-Speed Motors**

Actual operating speed of multi-speed PSC and SP motors is determined by the load applied by the air moving device. In general, if the air mover is properly sized to the motor, there will be a detectable difference in speed.

**When operating the motor without a load, there will not be a detectable difference in speeds.** Also, a no load operation for more than a few minutes of an air over (AO) motor will result in overheating and deterioration of the insulation.

**⚠ DANGER** *Before performing any maintenance, disconnect power and allow motor to come to a complete stop. Discharge capacitors, if any, for safety.*

### **Recommended Maintenance**

Remove dirt accumulations in and around vent openings, by vacuuming. **Dirt accumulations can cause motor overheating and a fire hazard.** Enclosed motors can be cleaned with an air jet; wear eye protection.

Periodically inspect the installation. Check for dirt accumulations; unusual noises or vibration; overheating; worn or loose couplings, sheaves and belts; high motor current; poor wiring or overheated connections; loose mounting bolts or guards; and worn motor starter contacts.

Exercise caution with solvents; some solvents may attack motor insulation, finish or bearing lubricants; some are highly flammable. If solvents are used, make sure area is well ventilated.

Sleeve bearing motors require periodic reoiling. Follow reoiling instructions on the motor (see nameplate or terminal box cover). If instructions are not included, re-oil continuous duty units once a year, intermittent duty units every two years and occasional duty units every five years with 30 to 35 drops of SAE No. 20 non-detergent or electric motor oil. Do not over-lubricate.

Dayton ball bearing motors are pre-lubricated at the factory and do not require relubrication.

**Order Replacement Parts By Calling Toll Free 1-800-323-0620**

Please provide following information:

- Model Number
- Serial Number (if any)
- Part Description and Number as shown in Parts List.

Address parts correspondence to:

Grainger Parts Operations  
P.O. Box 3074  
1657 Shermer Road  
Northbrook, IL 60065-3074

**NOTES:**

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## Troubleshooting

This chart suggests common answers to electric motor problems. The information is not all-inclusive and does not necessarily apply in all cases. When unusual operating conditions, repetitive failures, or other problems occur, consult an electric motor service firm for assistance.

Symptoms	Possible Cause(s)	Corrective Action
Motor fails to start	Blown fuses	Replace with time-delay fuses. Check for grounded winding
	Tight shaft	Occasionally during shipment a sleeve bearing motor may be received with a shaft which does not rotate freely. It may be necessary to strike the motor, at the shell/endshield rabbet, with a rawhide or plastic mallet to align the bearings
	Voltage too low at motor terminals due to the line drop	Consult local power company. Increase wire size (refer to Minimum Wire Size Table). Check for poor connection
	If permanent split capacitor motor, capacitor may be defective	Indicated by humming sound. Replace run capacitor. See nameplate for correct value
	Overload (internal thermal protector) tripped	Check motor load. If motor has an automatic reset thermal protector, turn off power, allow motor to cool
	Improper line connections	Check connections against diagram supplied with motor
Motor does not come up to speed or takes too long to accelerate	Motor may be overloaded	Reduce load or increase motor size
	Defective motor or starter	Repair or replace
	Not applied properly	Consult motor service firm for proper type. Use larger motor
	Voltage too low at motor terminals	Increase wire size (refer to Minimum Wire Size Table). Check for poor connections
	Starting load too high	Check load motor is carrying at start
Insufficient speed change	Excess loading; tight belts	Reduce load; increase motor size. Adjust belts
	Defective motor	Repair or replace
	Inadequate starting torque. High inertia load	Replace with larger motor
Motor stalls during operation	Overloaded motor	Reduce load or increase motor size
	Low motor voltage	Verify that nameplate voltage is maintained
Motor vibrates or is excessively noisy	Motor shaft misaligned	Realign
	Loose or defective or out-of-balance fan blade or blower wheel	Tighten setscrew(s); repair or replace fan blade or blower wheel
	Worn, damaged, dirty or overloaded bearings	Repair or replace motor; check loading and alignment

Symptoms	Possible Cause(s)	Corrective Action
	Defective winding. Bent or bowed shaft	Replace Motor
Motor overheats while running under load	Overloaded	Reduce load; increase motor size; belts may be too tight
	Dirt blocking ventilation openings	Clean motor
	Faulty connection	Clean, tighten, or replace
	High or low voltage	Check voltage at motor, should not be more than 10% above or below rated
	Defective motor	Repair or replace

**SERVICE RECORD:**

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## Limited Warranty

**Dayton One-Year Limited Warranty.** Electric motors are warranted by Dayton Electric Manufacturing Company (Dayton) to the original user against defects in workmanship or materials under normal use for one year after date of purchase. Any part which is determined to be defective in material or workmanship and returned to an authorized service location, as Dayton designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced at Dayton's option. For limited warranty claim procedures, see "PROMPT DISPOSITION" below. This limited warranty gives purchasers specific legal rights which vary from jurisdiction to jurisdiction.

**Limitation of Liability.** To the extent allowable under law, Dayton's liability for consequential and incidental damages is expressly disclaimed. Dayton's liability in all events is limited to and shall not exceed the purchase price paid.

**Warranty Disclaimer.** Dayton has made a diligent effort to illustrate and describe the products in this literature accurately; however, such illustrations and descriptions are for the sole purpose of identification, and do not express or imply a warranty that the products are merchantable, or fit for a particular purpose, or that the products will necessarily conform to the illustrations or descriptions.

Except as provided below, no warranty or affirmation of fact, expressed or implied, other than as stated in the "LIMITED WARRANTY" above is made or authorized by Dayton.

**Product Suitability.** Many jurisdictions have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. While Dayton attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, please review the product application, and national and local codes and regulations, and be sure that the product, installation, and use will comply with them.

Certain aspects of disclaimers are not applicable to consumer products; e.g., (a) some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you; (b) also, some jurisdictions do not allow a limitation on how long an implied warranty lasts, consequently the above limitation may not apply to you; (c) by law, during the period of this limited warranty, any implied warranty of implied merchantability or fitness for a particular purpose applicable to consumer products purchased by consumers, may not be excluded or otherwise disclaimed.

**Prompt Disposition.** Dayton will make a good faith effort for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call dealer from whom the product was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to Dayton at address below, giving dealer's name, address, date, and number of dealer's invoice, and describing the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file claim with carrier.

**Manufactured for Dayton Electric Mfg. Co.  
5959 West Howard Street  
Niles, Illinois 60714 U.S.A.**

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8S470





No. 6X653



### Oval 370 & 440 Volt Run Capacitors

Operate in temperatures of -40°F to 156°F (-40°C to 70°C) with microfarad values within ±6% of nominal rating. Hermetically sealed aluminum case with turnplate steel cover.

1/4" male quick-connect terminals. Phenolic insulating bushings. Individually cartoned.

Uses: Air conditioners and refrigerators.

MFD Rating	Dimensions (in.)			E.I.A. UL Base	GE Model	Stock No.
	Depth	Width	Height			
<b>370VAC OVAL</b>						
2	1 1/8	2 3/8	2 1/2	A	97F5502BX	6X650
3	1 1/8	2 3/8	2 1/2	A	97F5503BX	6X651
4	1 1/8	2 3/8	2 1/2	A	97F5704BX	6X652
5	1 1/8	2 3/8	2 1/2	A	97F5705BX	6X653
6	1 1/8	2 3/8	2 1/2	A	97F5706BX	6X654
7.5	1 1/8	2 3/8	2 1/2	A	97F9001BX	6X655
10	1 1/8	2 3/8	2 1/2	A	97F9002BX	6X656
12.5	1 1/8	2 3/8	3 1/8	A	97F9003BX	6X657
15	1 1/8	2 3/8	2 1/2	C	97F9121BX	6X658
17.5	1 1/8	2 3/8	2 1/2	C	97F9601BX	6X659
20	1 1/8	2 3/8	2 1/2	C	97F9603BX	6X660
25	1 1/8	2 3/8	2 1/2	C	97F9607BX	6X661
30	1 1/8	2 3/8	3 1/8	C	97F9609BX	6X662
35	1 1/8	2 3/8	3 1/8	C	97F9612BX	6X663
40	1 1/8	2 3/8	3 1/8	C	97F9615BX	6X664
45	2	3 1/8	2 1/2	D	97F9618BX	5X432
50	2	3 1/8	2 1/2	D	97F9622BX	5X433
15/5	1 1/8	2 3/8	2 1/2	C	97F9437BX	4X760
17.5/5	1 1/8	2 3/8	2 1/2	C	97F5474BX	4X762
20/5	1 1/8	2 3/8	2 1/2	C	97F9673BX	4X764
25/5	1 1/8	2 3/8	2 1/2	C	97F9675BX	4X766
30/5	1 1/8	2 3/8	3 1/8	C	97F9681BX	4X767
35/5	1 1/8	2 3/8	3 1/8	C	97F9796BX	4X768
<b>440VAC OVAL</b>						
4	1 1/8	2 3/8	2 1/2	A	97F5337BX	4M988
5	1 1/8	2 3/8	2 1/2	A	97F5339BX	4M989
6	1 1/8	2 3/8	2 1/2	A	97F5436BX	4M990
7.5	1 1/8	2 3/8	2 1/2	A	97F9036BX	4M875
10	1 1/8	2 3/8	3 1/8	A	97F5300BX	6X665
15	1 1/8	2 3/8	2 1/2	C	97F9627BX	6X666
17.5	1 1/8	2 3/8	2 1/2	C	97F9629BX	6X667
20	1 1/8	2 3/8	2 1/2	C	97F9631BX	6X668
25	1 1/8	2 3/8	2 1/2	C	97F9633BX	6X669
30	1 1/8	2 3/8	3 1/8	C	97F9637BX	6X670
35	1 1/8	2 3/8	3 1/8	C	97F9638BX	6X671
40	1 1/8	2 3/8	3 1/8	C	97F9641BX	6X672
45	2	3 1/8	3 1/8	D	97F9644BX	5X434
50	2	3 1/8	3 1/8	D	97F5320BX	4X758
55	2	3 1/8	4 1/8	D	97F9084BX	5X435

UL recognized by type number: (\*) Type P921, (†) Type P923, (‡) Type P924.

### Oval or Round Capacitor Accessories



# KBWC

## Wall-Mount Series

### Solid-State

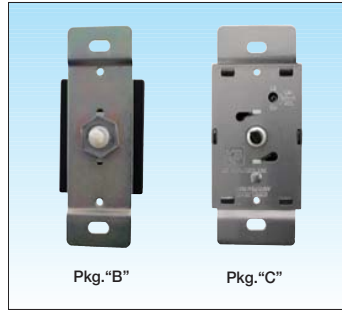
### Variable Speed AC Motor Controls

**For Use with Shaded Pole,  
Permanent Split Capacitor (PSC)  
and Universal Motors**

Ratings: 2.5 thru 15.0 Amps  
115 and 230 VAC – 50/60 Hz

#### TYPICAL APPLICATIONS

- Fans • Fireplace Blowers • Humidifiers • Air Conditioners
- Ceiling Fans • Attic Fans
- Ventilators • Range Hoods



Pkg. "B"

Pkg. "C"



Dial Plate & Knob Pkgs. "B" & "C"



Pkg. "E"



Pkg. "D"

#### STANDARD FEATURES

- Built-In On/Off AC Line Switch
- Minimum Speed Trimpot
- RFI Filter (Provides RFI and EMI Suppression)
- All Models Mount in a Standard 2" x 4" Electrical Wall Box
- Agency Approvals\*
  - UL Listing / Recognition
  - CSA Certified
  - ISO-9001: 2000 QMS Certified

#### OPTIONAL FEATURES (See Options Table)

- Custom Packaging
- Special Lead Lengths, Colors, and Terminations

#### DESCRIPTION

The KBWC Series is a comprehensive line of motor speed controls for air-moving applications that utilize Shaded Pole, Permanent Split Capacitor (PSC), and AC/DC motors. These economical speed controls are designed to replace obsolete, tapped winding, or reactive methods of speed control. The full-wave phase control circuitry minimizes power loss, thereby reducing energy requirements. The controls provide infinitely variable speed adjustment which allows the end-user to select the desired level of air volume. These models cover a wide range of current ratings (2.5 - 15 Amps AC) and voltage ratings (115, 230, 277 Volts AC).

Important features, such as RFI Filter, Minimum Speed Trimpot, and built-in On/Off Line Switch are standard. These speed controls are available as bulk packaged or in distributor type packaging with accessories such as: knob, dial plate, mounting hardware, instructions, and individual carton. All models are designed to be mounted into a standard 2" X 4" electrical wall box.

#### OPTIONS (Add Suffix to Model No.)

Suffix	Description	Example
C	Omits mounting tabs (KBWC-16 only).	KBWC-16C
F	Adds Built-In Fuse (not available for Model KBWC-23NS).	KBWC-15F
K	Mounting Kit: Includes individual packaging with dial plate, knob, mounting screws, wire connectors, and instructions. Supplied standard on all models rated 8 Amps and above.	KBWC-15K
L	Adds auxiliary lead (3-wire control).	KBWC-15L
4L	Adds DPDT On/Off Switch (4-wire control) (Model KBWC-25 only).	KBWC-25 (4L)
NS	Omits On/Off Switch.	KBWC-15NS
R	Reverses control output from standard rotation. Standard: Controls with On/Off Switch – Off to High to Low. Controls without On/Off Switch (suffix "NS") – Low to High.	KBWC-15R

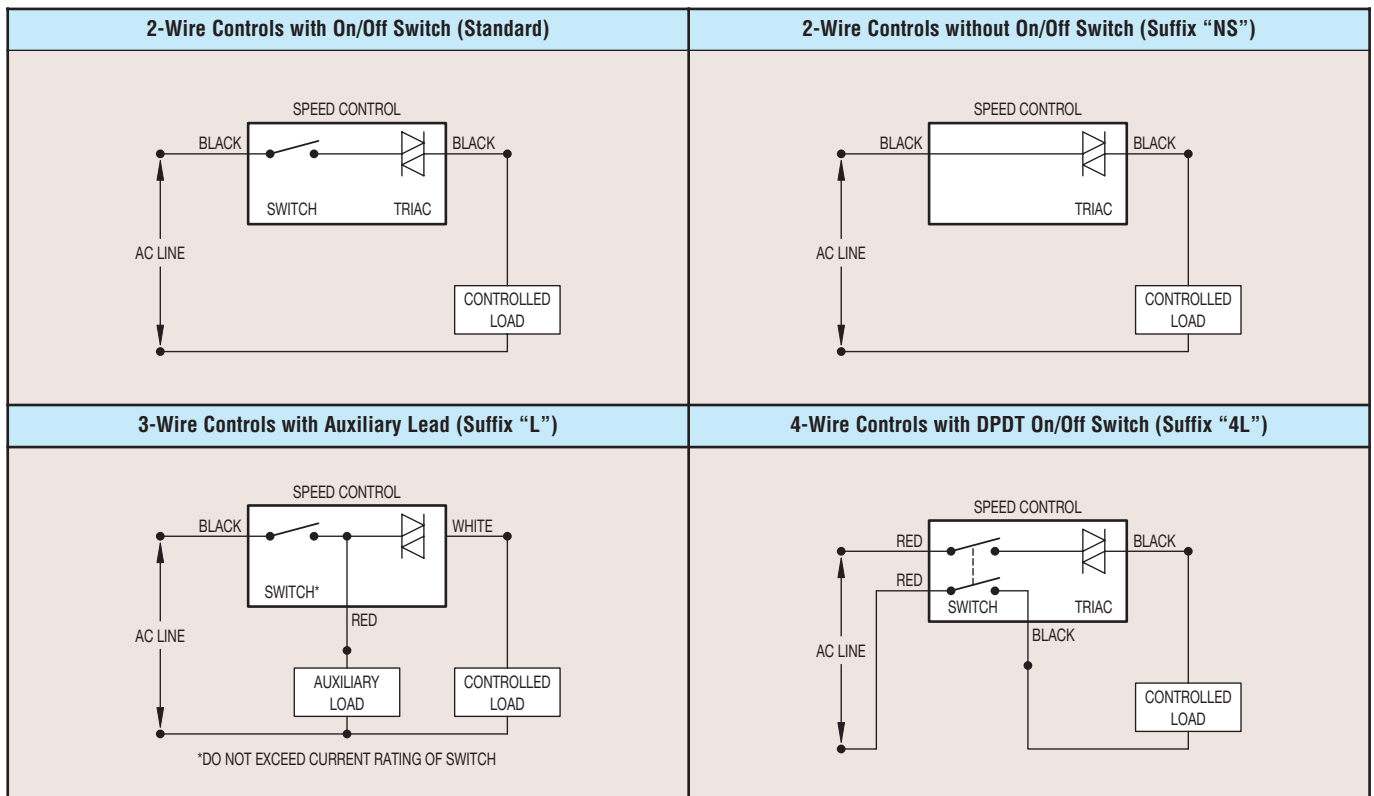
**Note:** \*See Electrical Ratings table for agency approvals by Model No.

**ELECTRICAL RATINGS AND AGENCY APPROVALS**

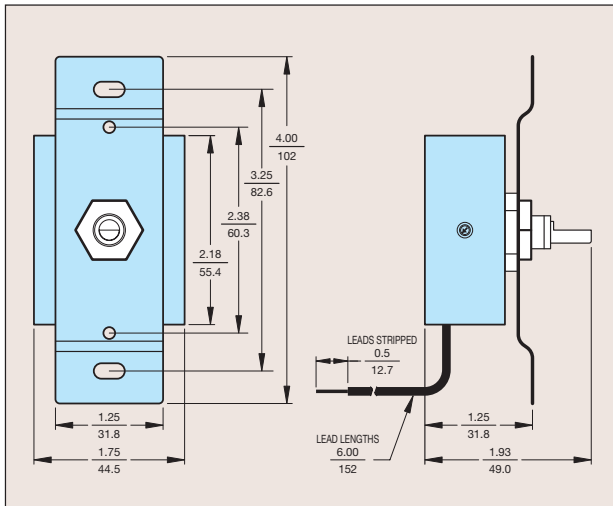
Model No.	AC Line Input Voltage (Volts AC – 50/60 Hz)	Maximum Current Rating (Amps RMS)	Ambient Temperature (°C)	Agency Approvals			Package Type
				cUL <sup>us</sup>	cUL <sup>us</sup>	CSA	
KBWC-13	115	2.5	25	✓		✓	B
KBWC-15	115	5	40		✓	✓	C
KBWC-16	115	6	25	✓			C
KBWC-18K <sup>1</sup>	115	8	40		✓	✓	D
KBWC-110K <sup>1</sup>	115	10	25	✓		✓	D
KBWC-110K <sup>1</sup>	115	10	40		✓	✓	E
KBWC-112K <sup>1</sup>	115	12	40				E
KBWC-115K <sup>1</sup>	115	15	25	✓			E
KBWC-23 <sup>2</sup>	230	2.5	25	✓			B
KBWC-25 <sup>3</sup>	230	5	40	✓			C
KBWC-26	230	6	25				C
KBWC-28K <sup>1</sup>	230	8	40			✓	D
KBWC-210K <sup>1</sup>	230	10	40				E
KBWC-212K <sup>1</sup>	230	12	40				E
KBWC-215K <sup>1</sup>	230	15	25				E
KBWC-35	277	5	25	✓			C
KBWC-36	277	6	25				C
KBWC-38K <sup>1</sup>	277	8	25				D
KBWC-310K <sup>1</sup>	277	10	25				D
KBWC-312K <sup>1</sup>	277	12	25				E
KBWC-315K <sup>1</sup>	277	15	25				E

Notes: 1. Models rated 8 Amps and above include Mounting Kit (suffix "K"). 2. Only model containing suffix "NS" is UL Recognized. 3. Only Model KBWC-25 (4L) is UL Recognized. 4. The maximum Locked Rotor current for UL listed controls is 6 times the Maximum Current Rating.

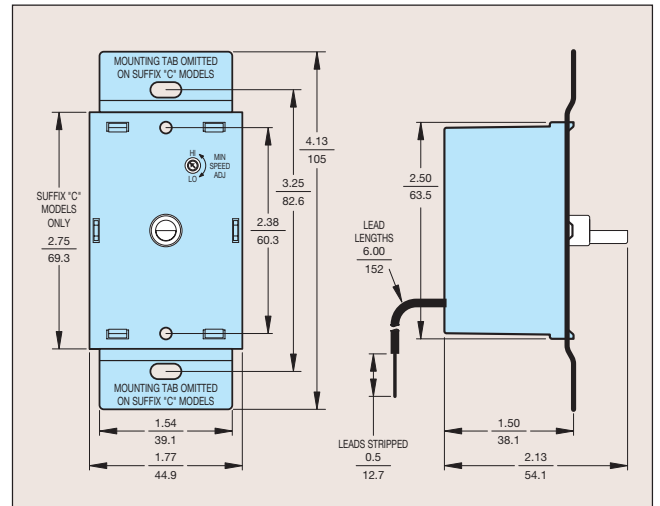
**CONNECTION DIAGRAMS**



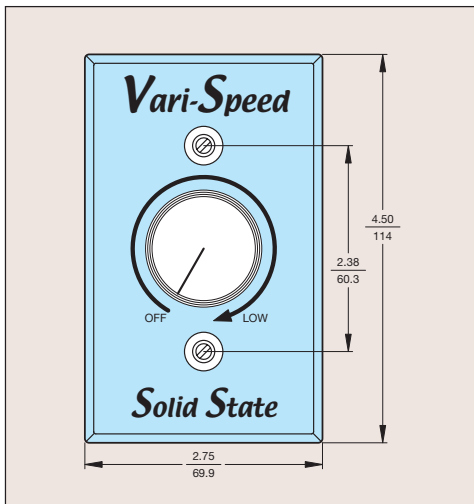
**KBWC-13, 23 (Pkg. B)**  
**Mechanical Specifications (Inches/mm)**



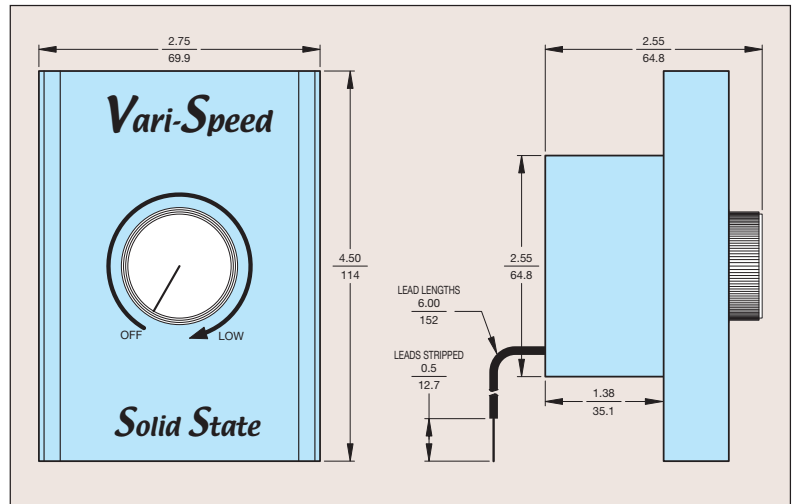
**KBWC-15, 16, 25, 26, 35, 36 (Pkg. C)**  
**Mechanical Specifications (Inches/mm)**



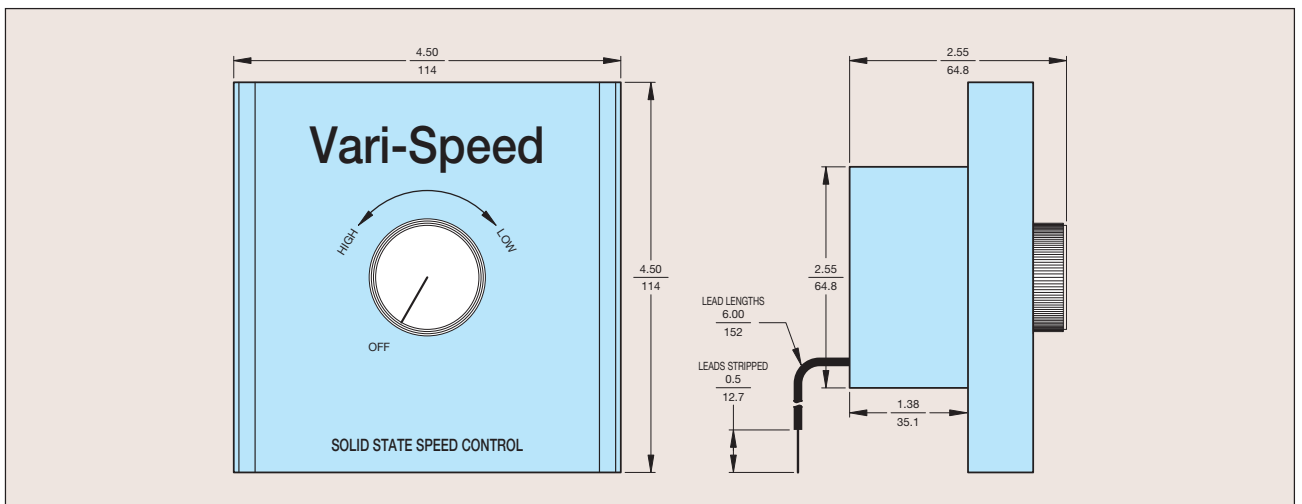
**Dial Plate and Knob Kit (Suffix "K")**  
**Mechanical Specifications (Inches/mm)**



**KBWC-18K, 110K, 28K, 38K, 310K (Pkg. D)**  
**Mechanical Specifications (Inches/mm)**



**KBWC-110K, 112K, 115K, 210K, 212K, 215K, 312K, 315K, (Pkg. E)**  
**Mechanical Specifications (Inches/mm)**



### APPLICATION NOTES

- 1. Radio Frequency Interference (RFI):** All solid-state speed controls generate annoying radio noise on the AM band. KB speed controls contain, as standard, a high-gain RFI suppression filter which significantly reduces this interference.
- 2. Low End Set Point (Minimum speed):** All 115 Volt input speed controls are factory set to 60 Volts AC output ( $\pm 3$  Volts), as standard. All 230 Volt input speed controls are factory set to 120 Volts AC output ( $\pm 6$  Volts), as standard. All controls are factory calibrated using an average responding AC voltmeter. Custom voltage settings are available.
- 3. Motor Suitability:** Motors must be loaded to near full capacity with the appropriate fan blade in order to achieve proper speed control. Generally, motor suitability is established by determining motor speed as a function of applied voltage. A motor is determined as suitable if it changes speed linearly over a wide range of voltage.  
**It is required that all motors contain a built-in thermal overload protector when used with solid-state speed controls.**
- 4. 230 & 277 VAC Controls:** To achieve maximum reliability, all 230 VAC controls contain snubber networks that utilize Y-Type capacitors and flame-proof resistors. In addition, all 277 VAC controls contain MOV Transient Suppression.
- 5. Temperature Test:** The non-sinusoidal output voltage of a solid-state speed control may increase motor heating. Therefore, it is necessary that a temperature test be performed to ensure that the motor is operating within manufacturer's specifications.
- 6. Leads:** All leads are approximately 6" (15 cm) long and stripped 1/2" (1.25 cm). Custom lead lengths, colors, and terminations also available.

### OTHER AC MOTOR SPEED CONTROLS



RATINGS			
2.5 Amps AC at 115 and 230 Volts AC 50/60 Hz	1.6 and 3 Amps at 115 and 230 Volts 50/60 Hz	1.6, 2.5 and 4 Amps at 115 and 230 Volts AC 50/60 Hz	300 Watts, 3 Amps AC at 125 Volts AC 50/60 Hz
DESCRIPTION			
<b>PANEL MOUNT:</b> For ceiling fans, range hoods, vibrators, humidifiers, air conditioners, fireplace blowers, window fans, etc. Designed for Shaded Pole, AC/DC, and Permanent Split Capacitor Motors.			<b>PLUG-IN:</b> For incandescent lamps and wood-burning fireplaces and stove fans. Plugs into a standard 115 Volt AC outlet.

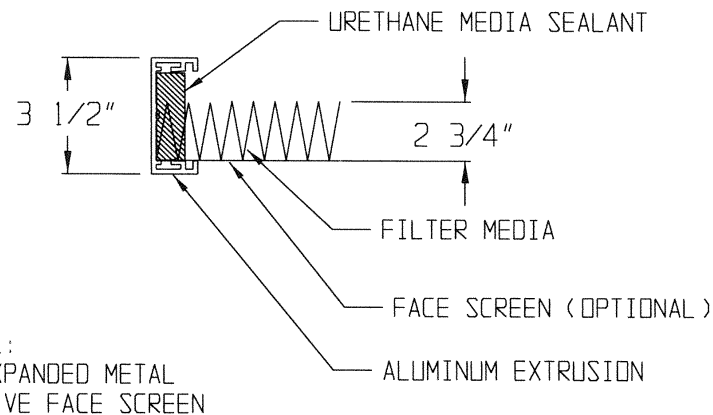
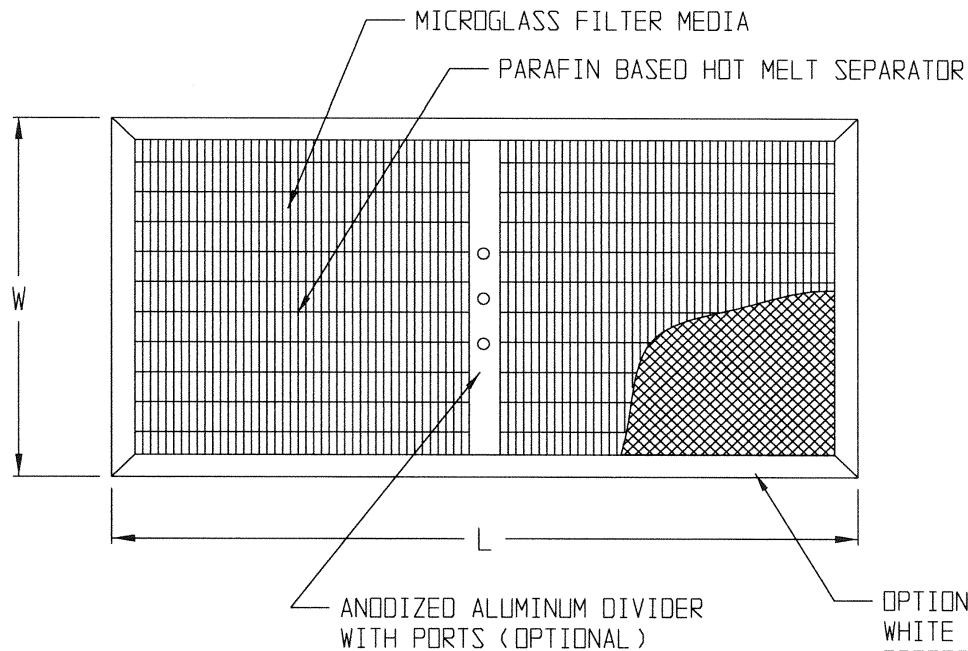


**KB ELECTRONICS, INC.**

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Outside Florida Call **Toll Free** (800) 221-6570 • **email** – info@kbelectronics.com

www.kbelectronics.com



NOTES:

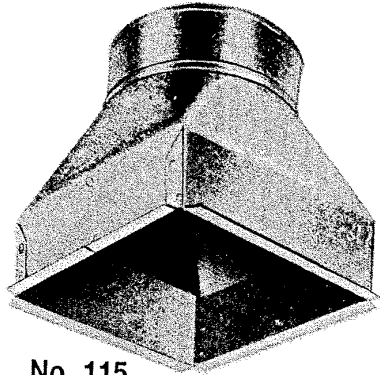
- MEDIA PACK TO BE 2 3/4" DEEP
- FILTER MANUFACTURED TO MEET I.E.S. SPECIFICATIONS
- FILTER IS RATED AT 99.99% ON PARTICLES OF 0.3 MICRONS
- FILTER IS CHALLENGED WITH EMERY 3004 AND SCANNED FOR LEAKS

OPTIONAL:  
WHITE EXPANDED METAL  
PROTECTIVE FACE SCREEN

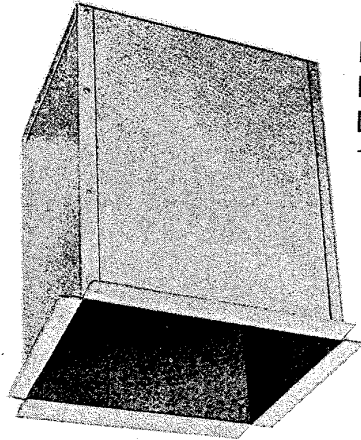
MODEL	SIZE= W X L X D	MEDIA	CFM@1"SP	SP@90FPM
H1919B66-BAABCAA	19.75 X 19.75 X 3.5	68 SF	551	.28
H1943B66-BAABCAA	19.75 X 43.75 X 3.5	163 SF	1319	.28

<b>HALCO PRODUCTS CO.</b>			
100 NO. GORDON STREET ELK GROVE, IL. 60007			
TITLE FT HEPA FILTER			
DRAWN BY	DK/JY	DWG NO.	2513107B0
SCALE	N/A	DATE	9/16/04
		SHEET	

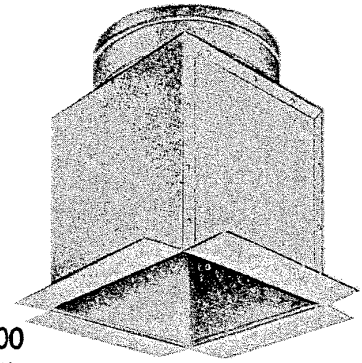
# REGISTER AND DIFFUSER BOXES



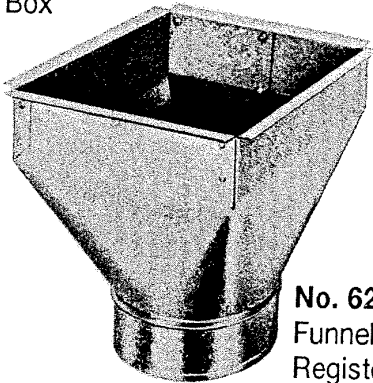
**No. 115**  
Funnel Diffuser  
Box



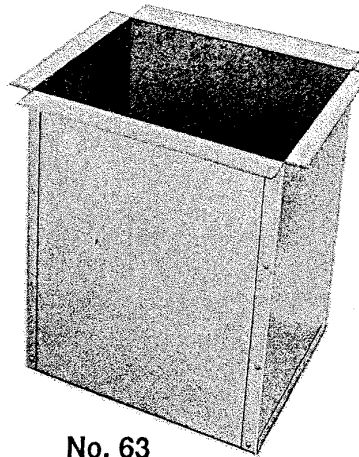
**No. 113**  
Blind  
Diffuser Box  
12" Deep



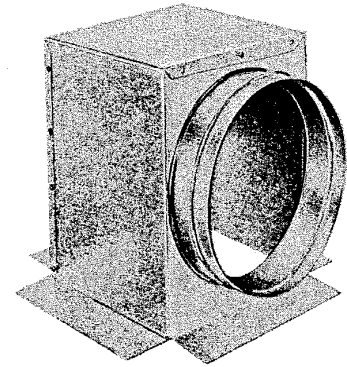
**No. 1000**  
Top Outlet  
Diffuser Box



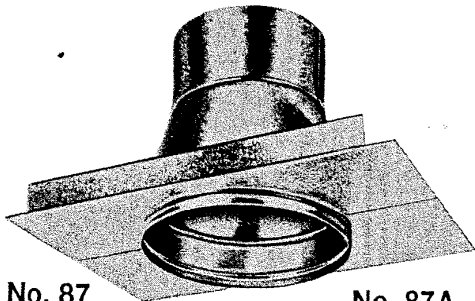
**No. 62**  
Funnel Floor  
Register Box



**No. 63**  
Blind Floor  
Register Box  
12" Deep



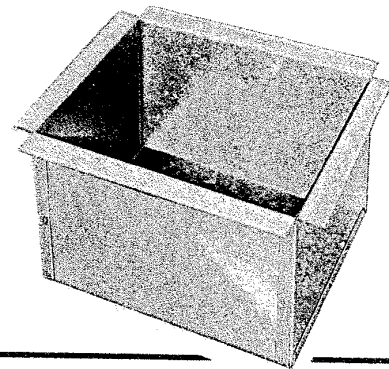
**No. 1001**  
Side Outlet  
Diffuser Box



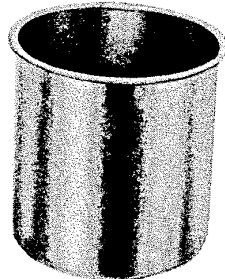
**No. 87**  
Round Ceiling  
Diffuser Outlet  
w/Damper

**No. 87A**  
Round Ceiling  
Diffuser Outlet  
No Damper

**No. 64**  
Blind Floor  
Register Box  
6" Deep

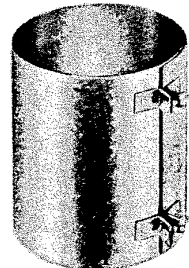
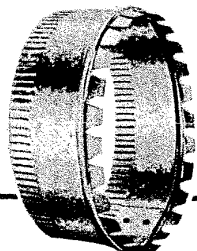


# ROUND COLLARS AND CONNECTORS

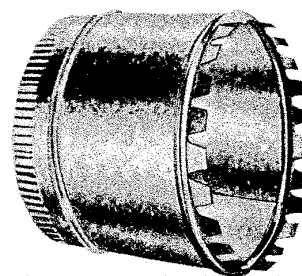


**No. 116**  
Flue Thimble

**No. 125**  
Starting Collar  
**No. 125NC**  
Starting Collar  
No Crimp



**No. 119**  
Drawband  
w/Nut & Bolt



**No. 125L**  
Starting  
Collar  
6" Long

# CHAPTER

# 4



# HALCO PRODUCTS COMPANY

100 N. Gordon St. Elk Grove Village, IL 60007-1193

Phone (847) 956-1600 Fax (847) 956-0595

E-mail: [info@halco-products.com](mailto:info@halco-products.com)

Website: [www.halco-products.com](http://www.halco-products.com)

## WARRANTY

**HALCO PRODUCTS COMPANY** warrants that the workmanship, materials, and construction of this item is free of manufacturing defects. This item and its associated systems are such that if operated and maintained in accordance with the manual supplied by **HALCO PRODUCTS COMPANY**, it will meet all contract specifications for a period of one (1) year from date of delivery. This warranty shall not apply to replaceable items such as filters or light bulbs, or if the equipment is subject to misuse, accident, negligence, or lack of proper maintenance. Electrical motors and blowers and pre-manufactured items are subject to manufacturers' guarantees.

CUSTOMER: \_\_\_\_\_

ADDRESS: \_\_\_\_\_  
\_\_\_\_\_

P.O. # : \_\_\_\_\_ INVOICE # : \_\_\_\_\_ SERIAL #: \_\_\_\_\_

MODEL #: \_\_\_\_\_ SIZE: \_\_\_\_\_

START-UP DATE: \_\_\_\_\_ INSPECTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

### WARRANTY REGISTRATION CARD

Please return this card within 30 days of delivery

Customer: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

P.O.#: \_\_\_\_\_ Invoice #: \_\_\_\_\_ Serial #: \_\_\_\_\_

Model #: \_\_\_\_\_ Start-Up Date: \_\_\_\_\_

Sizes: \_\_\_\_\_ Customer Inspector: \_\_\_\_\_ Date: \_\_\_\_\_