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 TAOYUAN SHIEN 333, TAIWAN, R. O. C.

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SPECIFICATION FOR APPROVAL

Customer:

Description: DC FAN

Customer P/N: REV:

Delta Model NO.: AFB1212HHE-F00

Sample Rev: 00 Issue NO:

Sample Issue Date: AUG.09.2005. Quantity:

1. SCOPE:

THIS SPECIFICATION DEFINES THE ELECTRICAL AND MECHANICAL CHARACTERISTICS OF THE DC BRUSHLESS AXIAL FLOW FAN. THE FAN MOTOR IS WITH TWO PHASES AND FOUR POLES.

2. CHARACTERS:

ITEM	DESCRIPTION
RATED VOLTAGE	12 VDC
OPERATION VOLTAGE	4.0 - 13.2 VDC
INPUT CURRENT	0.46 (MAX. 0.70) A
INPUT POWER	5.52 (MAX. 8.40) W
SPEED	2900 R.P.M. (REF.)
MAX. AIR FLOW (AT ZERO STATIC PRESSURE)	3.400 (MIN. 3.130) M ³ /MIN. 120.07 (MIN. 110.53) CFM
MAX. AIR PRESSURE (AT ZERO AIRFLOW)	9.00 (MIN. 7.62) mmH ₂ O 0.354 (MIN. 0.300) inchH ₂ O
ACOUSTICAL NOISE (AVG.)	44.0 (MAX. 47.0) dB-A
INSULATION TYPE	UL: CLASS A

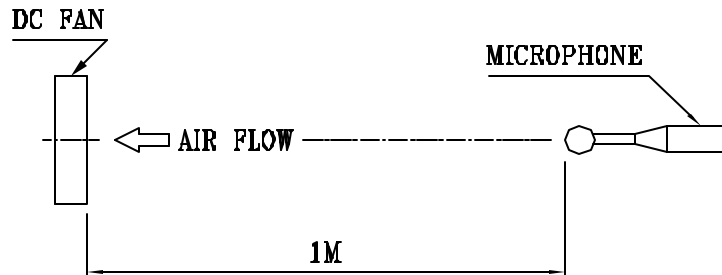
(continued)

PART NO:

DELTA MODEL: AFB1212HHE-F00

INSULATION STRENGTH	10 MEG OHM MIN. AT 500 VDC (BETWEEN FRAME AND (+) TERMINAL)
DIELECTRIC STRENGTH	5 mA MAX. AT 500 VAC 60 Hz ONE MINUTE, (BETWEEN FRAME AND (+) TERMINAL)
EXTERNAL COVER	OPEN TYPE
LIFE EXPECTANCE	70,000 HOURS CONTINUOUS OPERATION AT 40 °C WITH 15 ~ 65 %RH.
ROTATION	CLOCKWISE VIEW FROM NAME PLATE SIDE
OVER CURRENT SHUT DOWN	THE CURRENT WILL SHUT DOWN WHEN LOCKING ROTOR.
LEAD WIRE	UL 1007 -F- AWG #24 BLACK WIRE NEGATIVE(-) RED WIRE POSITIVE(+) BLUE WIRE FREQUENCY(-F00)

- NOTES: 1. ALL READINGS ARE MEASURED AFTER STABLY WARMING UP THROUGH 10 MINUTES.
2. THE VALUES WRITTEN IN PARENS , (), ARE LIMITED SPEC.
3. ACOUSTICAL NOISE MEASURING CONDITION:



NOISE IS MEASURED AT RATED VOLTAGE IN FREE AIR IN ANECHOIC CHAMBER WITH B & K SOUND LEVEL METER WITH MICROPHONE AT A DISTANCE OF ONE METER FROM THE FAN INTAKE.

PART NO:

DELTA MODEL: AFB1212HHE-F00

3. MECHANICAL:

- 3-1. DIMENSIONS ----- SEE DIMENSIONS DRAWING
- 3-2. FRAME ----- PLASTIC UL: 94V-0
- 3-3. IMPELLER ----- PLASTIC UL: 94V-0
- 3-4. BEARING SYSTEM ----- TWO BALL BEARINGS
- 3-5. WEIGHT ----- 256 GRAMS

4. ENVIRONMENTAL:

- 4-1. OPERATING TEMPERATURE ----- -10 TO +60 DEGREE C
- 4-2. STORAGE TEMPERATURE ----- -40 TO +75 DEGREE C
- 4-3. OPERATING HUMIDITY ----- 5 TO 90 % RH
- 4-4. STORAGE HUMIDITY ----- 5 TO 95 % RH

5. PROTECTION:

5-1. LOCKED ROTOR PROTECTION

IMPEDANCE OF MOTOR WINDING PROTECTS MOTOR FROM FIRE IN 96 HOURS OF LOCKED ROTOR CONDITION AT THE RATED VOLTAGE.

5-2. POLARITY PROTECTION

BE CAPABLE OF WITHSTANDING IF REVERSE CONNECTION FOR POSITIVE AND NEGATIVE LEADS.

6. RE OZONE DEPLETING SUBSTANCES:

- 6-1. NO CONTAINING PBBs, PBBOs, CFCs, PBBEs, PBDPEs AND HCFCs.

7. PRODUCTION LOCATION

- 7-1. PRODUCTS WILL BE PRODUCED IN CHINA OR THAILAND OR TAIWAN.

PART NO:

DELTA MODEL: AFB1212HHE-F00

8. BASIC RELIABILITY REQUIREMENT:

8-1. THERMAL LOW TEMPERATURE: -40°C
CYCLING HIGH TEMPERATURE: +80°C
 SOAK TIME: 30 MINUTES
 TRANSITION TIME < 5 MINUTES
 DUTY CYCLES: 5

8-2. HUMIDITY TEMPERATURE: +25°C ~ +65°C
EXPOSURE HUMIDITY: 90-98% RH @ +65°C
 FOR 4 HOURS/CYCLE
 POWER: NON-OPERATING
 TEST TIME: 168 HOURS

8-3. VIBRATION TEMPERATURE: +25°C
 ORIENTATION: X, Y, Z
 POWER: NON-OPERATING
 VIBRATION LEVEL: OVERALL $g_{RMS}=3.2$

FREQUENCY(Hz)	PSD(G^2/Hz)
10	0.040
20	0.100
40	0.100
800	0.002
1000	0.002

TEST TIME: 2 HOURS ON EACH ORIENTATION

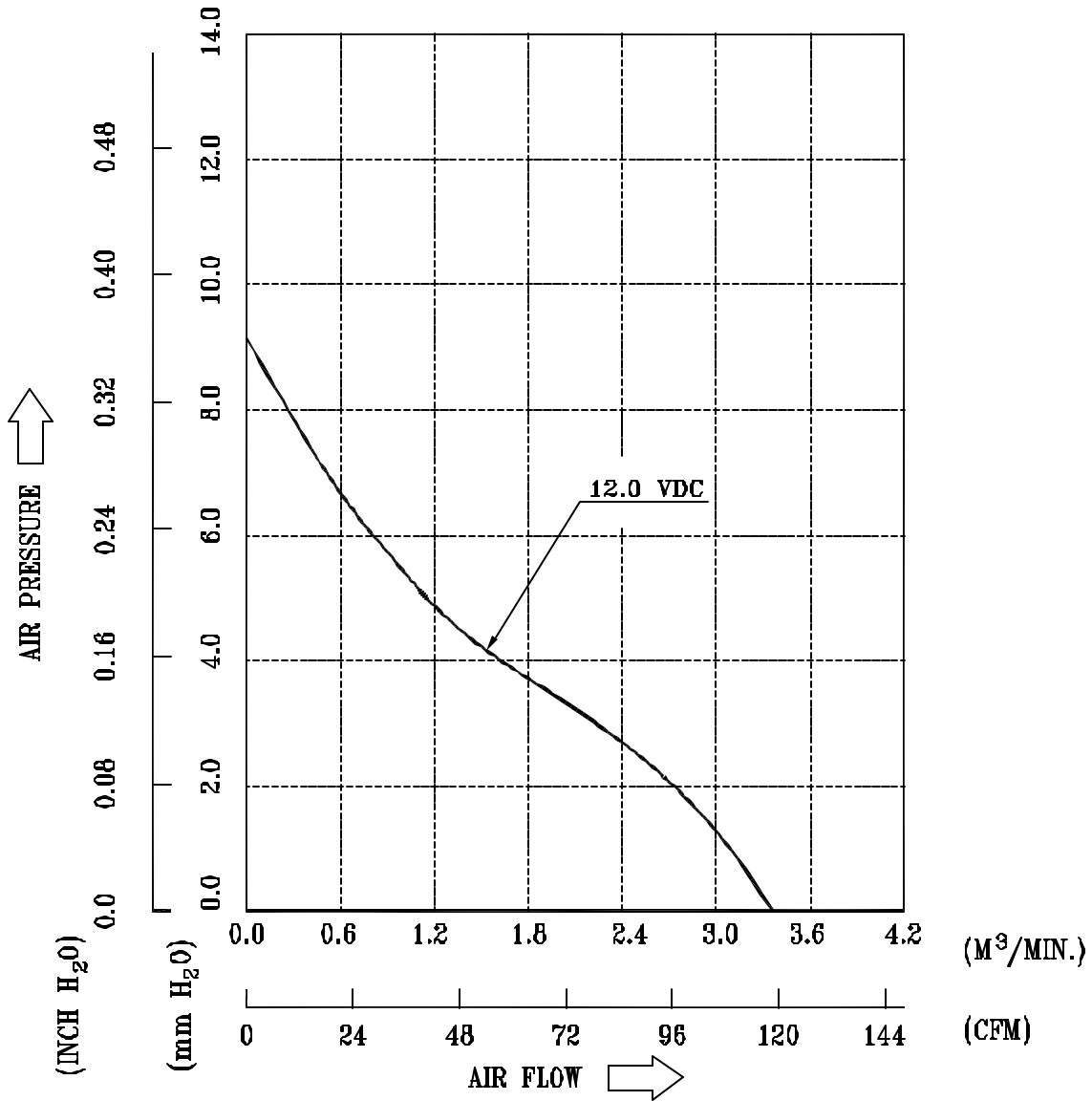
8-4. MECHANICAL TEMPERATURE: +20°C
SHOCK ORIENTATION: X, Y, Z
 POWER: NON-OPERATING
 ACCELERATION: 20 G MIN.
 PULSE: 11 ms HALF-SINE WAVE
 NUMBER OF SHOCKS: 5 SHOCKS
 FOR EACH DIRECTION

8-5. LIFE TEMPERATURE: MAX , OPERATING TEMPERATURE
 POWER: OPERATING
 DURATION: 1000 HOURS MIN.

PART NO:

DELTA MODEL: AFB1212HHE-F00

9. P & Q CURVE:



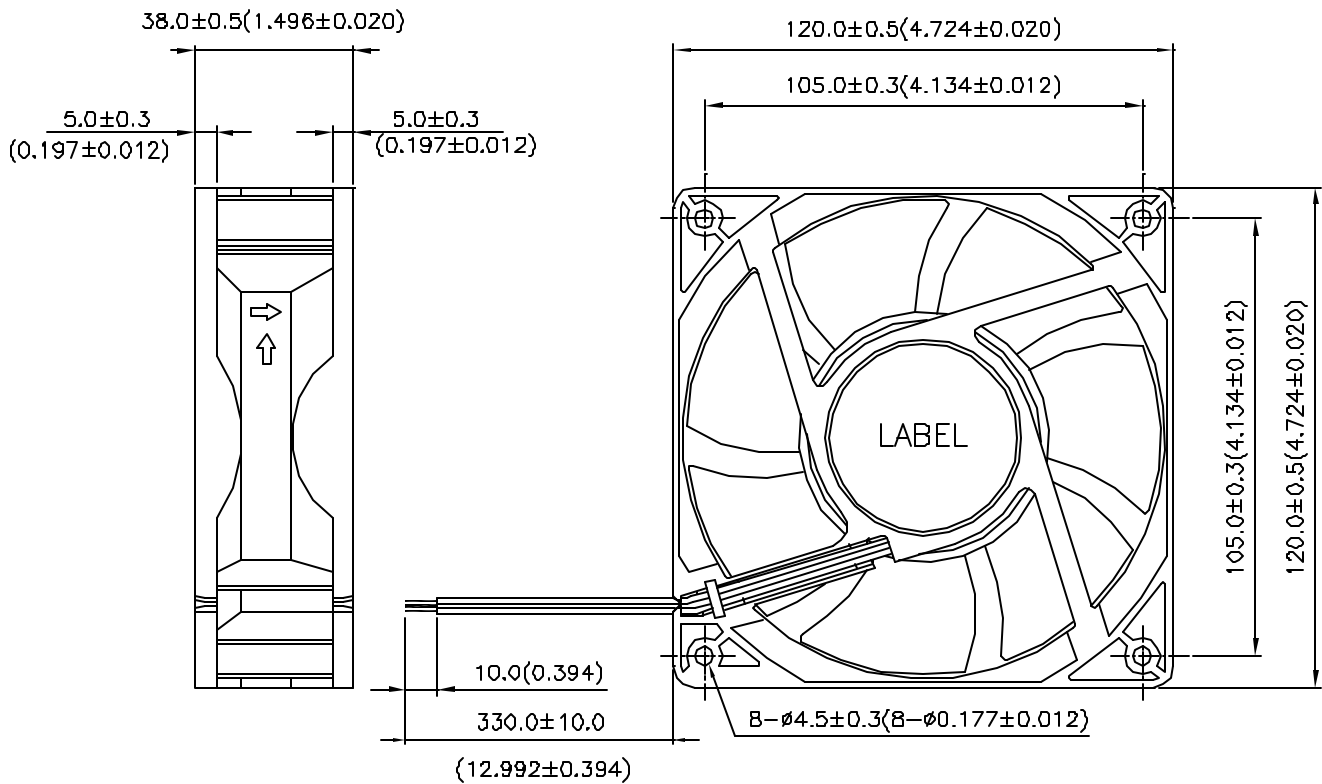
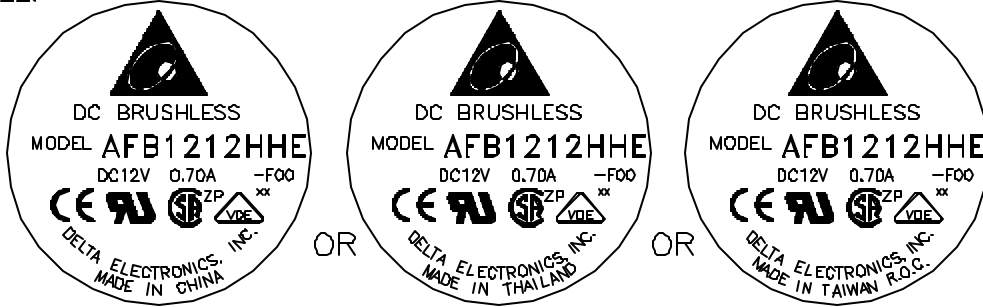
* TEST CONDITION: INPUT VOLTAGE ----- OPERATION VOLTAGE
TEMPERATURE ----- ROOM TEMPERATURE
HUMIDITY ----- 65%RH

PART NO:

DELTA MODEL: AFB1212HHE-F00

10. DIMENSION DRAWING:

LABEL:



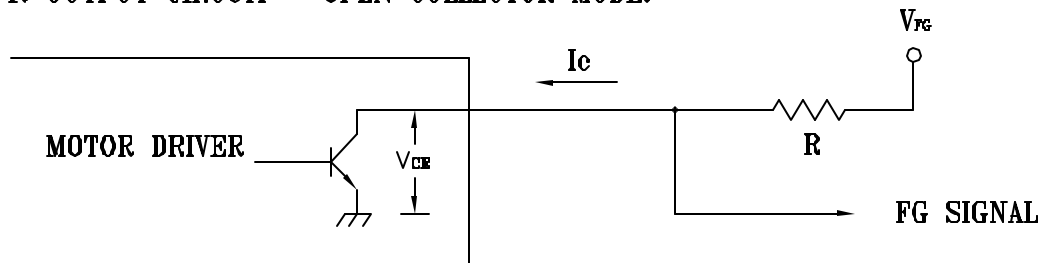
UNIT: mm(INCH)

PART NO:

DELTA MODEL: AFB1212HHE-F00

11. FREQUENCY GENERATOR (FG) SIGNAL:

1. OUTPUT CIRCUIT - OPEN COLLECTOR MODE:



CAUTION:

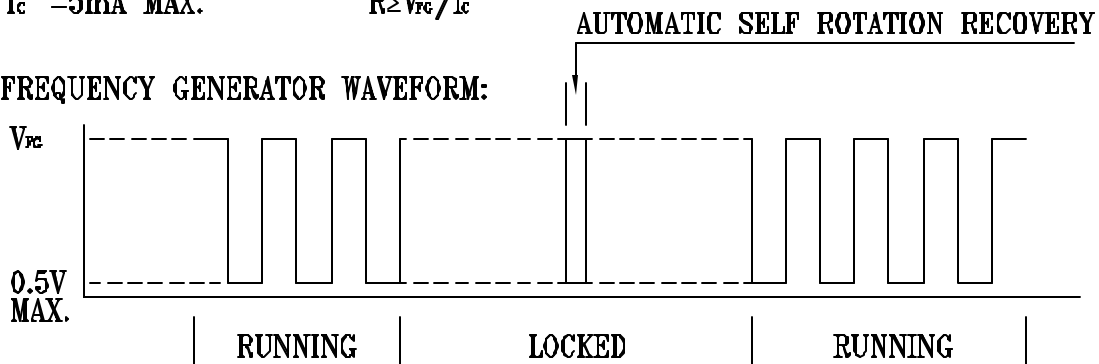
THE LEAD WIRE OF FG SIGNAL CAN NOT TOUCH
THE LEAD WIRE OF POSITIVE OR NEGATIVE.

2. SPECIFICATION:

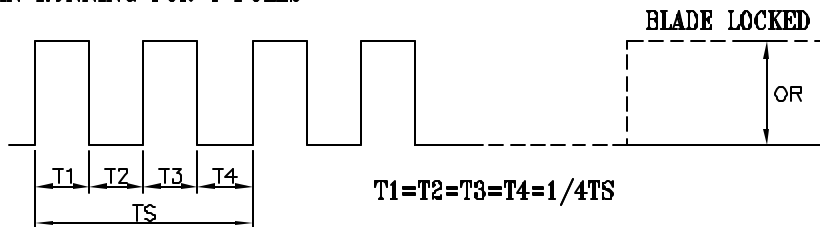
$V_{CE} (sat) = 0.5V \text{ MAX.}$ $V_{FG} = 45VDC \text{ MAX.}$

$I_c = 5mA \text{ MAX.}$ $R \geq V_{FG} / I_c$

3. FREQUENCY GENERATOR WAVEFORM:



FAN RUNNING FOR 4 POLES



$N = \text{R.P.M}$

$TS = 60/N(\text{SEC})$

*VOLTAGE LEVEL AFTER BLADE LOCKED

*4 POLES

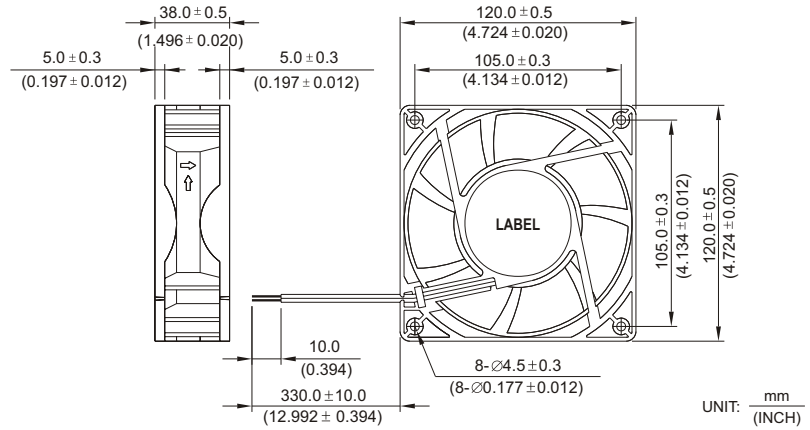


Descriptions:

- 1. Delta will not guarantee the performance of the products if the application condition falls outside the parameters set forth in the specification.**
- 2. A written request should be submitted to Delta prior to approval if deviation from this specification is required.**
- 3. Please exercise caution when handling fans. Damage may be caused when pressure is applied to the impeller, if the fans are handled by the lead wires, or if the fans are hard-dropped to the production floor.**
- 4. Except as pertains to some special designs, there is no guarantee that the products will be free from any such safety problems or failures as caused by the introduction of powder, droplets of water or encroachment of insect into the hub.**
- 5. The above-mentioned conditions are representative of some unique examples and viewed as the first point of reference prior to all other information.**
- 6. It is very important to establish the correct polarity before connecting the fan to the power source. Positive (+) and Negative (-). Damage may be caused to the fans if connection is with reverse polarity, as there is no foolproof method to protect against such error.**
- 7. Delta fans are not suitable where any corrosive fluids are introduced to their environment.**
- 8. Please ensure all fans are stored according to the storage temperature limits specified. Do not store fans in a high humidity environment. We highly recommend performance testing is conducted before shipping, if the fans have been stored over 6 months.**
- 9. Not all fans are provided with the Lock Rotor Protection feature. If you impair the rotation of the impeller for the fans that do not have this function, the performance of those fans will lead to failure.**
- 10. Please be cautious when mounting the fan. Incorrect mounting of fans may cause excess resonance, vibration and subsequent noise.**
- 11. It is important to consider safety when testing the fans. A suitable fan guard should be fitted to the fan to guard against any potential for personal injury.**
- 12. Except where specifically stated, all tests are carried out at relative (ambient) temperature and humidity conditions of 25°C, 65%. The test value is only for fan performance itself.**
- 13. Be certain to connect an “over 4.7µF” capacitor to the fan externally when the application calls for using multiple fans in parallel, to avoid any unstable power.**

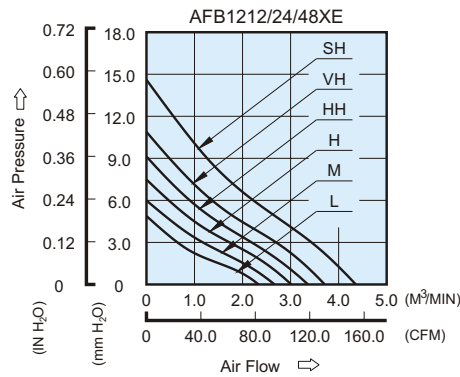
AFB 120 x 120 x 38 MM SERIES

DIMENSIONS DRAWING

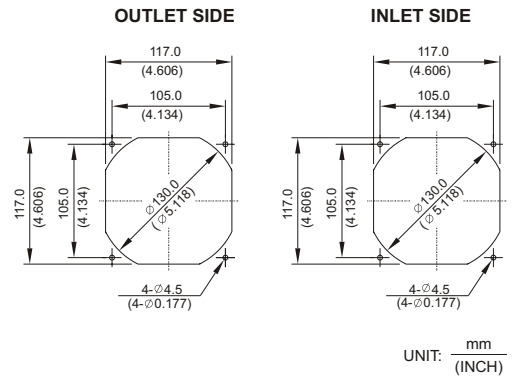


- * Bearing Type: Ball Bearings
- * Material: Impeller & Frame : Plastic (UL 94V-0)
- * Lead Wires : UL 1007 AWG #24 Or Equivalent
Red Wire Positive (+)
Black Wire Negative (-)
- * Weight : 256g (9.03 oz)

P & Q CURVE (AT RATED VOLTAGE)



MOUNTING PANEL CUTOUT



MODEL		Rated Voltage	Operating Voltage Range	Rated Current	Rated Input Power	Speed	Maximum Air Flow		Maximum Air Pressure		Noise
PART NO.	FUNCTION	VDC	VDC	Amp	Watt	R.P.M.	M ³ /min	CFM	mmH ₂ O	IN H ₂ O	dB-A
AFB1212LE	-R00 / -F00	12	4.0 to 13.2	0.19	2.28	2000	2.400	84.76	4.56	0.180	34.0
AFB1224LE	-R00 / -F00	24	7.0 to 27.6	0.15	3.60						
AFB1248LE	-R00 / -F00	48	28.0 to 56.0	0.06	2.88						
AFB1212ME	-R00 / -F00	12	4.0 to 13.2	0.26	3.12	2300	2.690	95.00	6.00	0.236	38.0
AFB1224ME	-R00 / -F00	24	7.0 to 27.6	0.19	4.56						
AFB1248ME	-R00 / -F00	48	28.0 to 56.0	0.08	3.84						
AFB1212HE	-R00 / -F00	12	4.0 to 13.2	0.32	3.84	2600	3.000	105.94	7.60	0.300	41.0
AFB1224HE	-R00 / -F00	24	7.0 to 27.6	0.24	5.76						
AFB1248HE	-R00 / -F00	48	28.0 to 56.0	0.12	5.76						
AFB1212HHE	-R00 / -F00	12	4.0 to 13.2	0.46	5.52	2900	3.400	120.07	9.00	0.354	44.0
AFB1224HHE	-R00 / -F00	24	7.0 to 27.6	0.30	7.20						
AFB1248HHE	-R00 / -F00	48	28.0 to 56.0	0.15	7.20						
AFB1212VHE	-R00 / -F00	12	4.0 to 13.2	0.60	7.20	3200	3.680	129.96	10.70	0.420	48.0
AFB1224VHE	-R00 / -F00	24	7.0 to 27.6	0.38	9.12						
AFB1248VHE	-R00 / -F00	48	28.0 to 56.0	0.18	8.64						
AFB1212SHE	-R00 / -F00	12	4.0 to 13.2	1.05	12.60	3700	4.300	151.85	14.50	0.571	53.0
AFB1224SHE	-R00 / -F00	24	7.0 to 27.6	0.50	12.00						

* Function type is optional.
 * The max. air flow and the speed are measured in free air ; max. air pressure is measured at zero air flow.
 * Noise is measured in anechoic chamber in free air, one meter from intake side.
 * All readings are typical values at rated voltage.
 * Specifications are subject to change without notice.

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DC Fan With Minimum Noise

Introductions

- Every model undergoes rigorous aerodynamic analysis and anechoic chamber test to achieve minimum noise under high airflow and air pressure conditions.
- High precision maintenance-free ball bearing system provides superb reliability.
- Frame and fan blade meet UL 94V-0 flammability rating.
- Every model features locked rotor protection and polarity protection, and offers optional frequency generator or rotation detector function.
- All DC fans are 100% balanced to guarantee low vibration and excellent durability.
- Automatic multi-axes winding, surface-mount machine and highly automated assembly lines enable mass production and consistent quality.
- UL, CSA, VDE approved.

Part Number Definition

AFB	12	12	H	E	-	B	F	00
1	2	3	4	5		6	7	8

1. SERIES CODE :

AFB,AHB,EFB,EHB,FFB,FHB,GFB,
LFB,NFB,TFB,BFB, KFB,KHB,SFB,

2. FRAME DIMENSION:

02	: 125 x 38 x 45 mm
03	: 30 mm SQUARE or 180 x 38 x 45 mm
032	: Ø32 x 9 mm
035	: 35 mm SQUARE
04	: 40 mm SQUARE or 42 x 45 x 19 mm
045	: 45 mm SQUARE
05	: 50 mm SQUARE or 51 x 51 x 15 mm
06	: 60 mm SQUARE
07	: 70 mm SQUARE or 75 x 75 x 30 mm
08	: 80 mm SQUARE
09	: 92 mm SQUARE
10	: 97 x 94 x 33 or Ø100 x 46.8 mm
12	: 120 mm SQUARE or 125 x 126 x 34 mm or 120 x 120 x 32 mm
13	: 127 mm SQUARE or Ø133 x 61.5 mm
14	: 140 mm SQUARE
15	: 172 x 150 mm
16	: 159 x 165 x 40 mm
17	: Ø172 mm or Ø175 x 69.0 mm

3. OPERATION VOLTAGE :

05	: DC 5V
12	: DC 12V
24	: DC 24V
48	: DC 48V

4. SPEED (RPM) :

L	: LOW
M	: MEDIUM
H	: HIGH
HH	: EXTRA HIGH
VH	: VERY HIGH
SH	: SUPER HIGH
EH	: EXTERNAL HIGH
GH	: GRAND HIGH SPEED
UH	: ULTRA HIGH SPEED
DH	: DRASTIC HIGH SPEED
XH	: EXTREME HIGH SPEED

5. FRAME THICKNESS:

A	: 10 mm
C	: 13 mm
B	: 15 mm
D	: 20 mm
(BLANK)	: 25.4 mm
N	: 28 mm
F	: 32 mm
E	: 38 mm
	or RIGHT SIDE EXHAUST (INTAKE VIEW FOR BFB SERIES)
G	: 50.8 mm OR 48mm
S	: 55 mm
T	: 61.0-71.0 mm
W	: 72.0-85.0 mm
U	: 86.0-105.0 mm
V	: 106.0-125.0 mm

6. FRAME TYPE:

(BLANK)	: FLANGE TYPE
B	: RIB TYPE (10mm, 13mm, 15mm, 20mm THICKNESS)
M	: METAL FRAME

7. SIGNAL OUTPUT :

F	: FREQUENCY GENERATOR OUTPUT (SPEED SENSOR) OR TACH OUTPUT
R	: ROTATION DETECTOR OUTPUT (FAILURE DETECTOR)

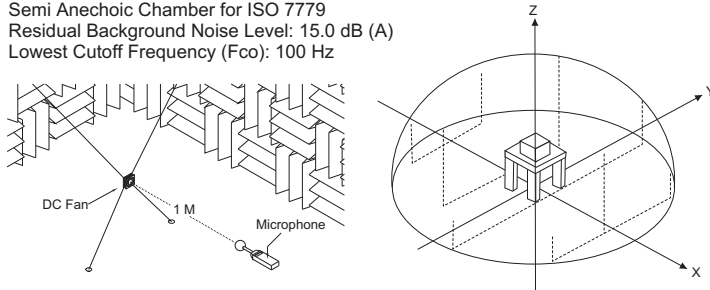
8. SIGNAL OUTPUT VOLTAGE :

00	: VCC (OPEN COLLECTOR)
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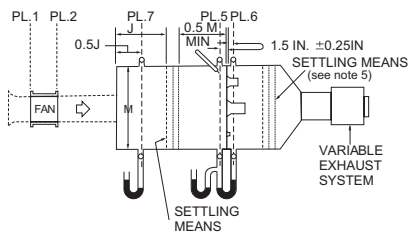
Note

1. NOISE IS MEASURED AT RATED VOLTAGE IN ANECHOIC CHAMBER IN FREE AIR WITH LARSON DAVIS AND WITH MICROPHONE AT A DISTANCE OF ONE METER FROM THE FAN INTAKE. REFER TO ANSI-S12.10 AS SHOWN BELOW:

SEMI ANECHOIC CHAMBER LEVEL
Semi Anechoic Chamber for ISO 7779
Residual Background Noise Level: 15.0 dB (A)
Lowest Cutoff Frequency (Fco): 100 Hz

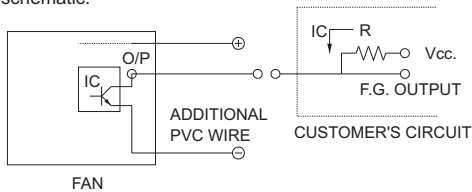


2. THE PERFORMANCE INCLUDING AIR FLOW AND AIR PRESSURE MEASURED AT RATED VOLTAGE IN DOUBLE CHAMBER IS MEASURED ACCORDING TO AMCA 210 STANDARD AS SHOWN BELOW:



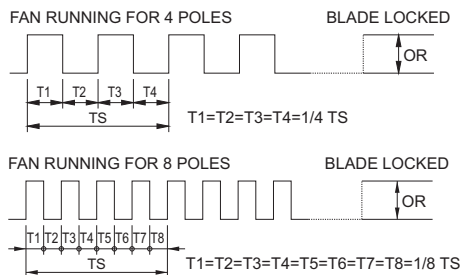
3. FREQUENCY GENERATOR O/P: (F00)

Frequency generator function is activated by an internal IC for customer's application.
Electrical schematic:



CUSTOMER'S CIRCUIT
Vcc = From +5 To +28 VDC (Generally using +12 or +24 VDC)
Ic = 5 mA max.
R = V/I (Output "R" value calculation)

SUPPLY A WAVEFORM:

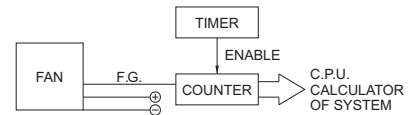


N=R.P.M. (Rotation speed will be different for various models L/M/H/HH/VH/SH)
TS=60/N (Sec)
* Voltage level after blade locked
* 4 POLES OR 8 POLES

OUTPUT LEVEL:

High = $V_{cc} \pm 10\%$
Low = 0~0.5V
Ic = 5 mA max.

APPLICATION:

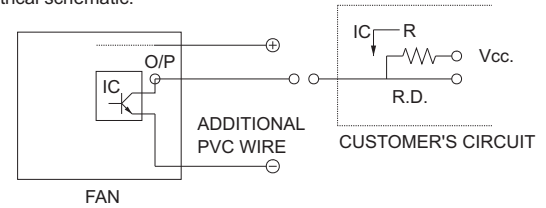


FUNCTIONS:

- By means of waveform & customer's design, schematic can reach alarm function, either in the form of buzzing or LED flashing. Adjust rotation speed.
- When power supply output voltage level decreases, it will result in the lowering of fan rotation speed. The irregular situation will be controlled by using F.G. O/P through P/S circuit to increase the output voltage and result in a stable rotation speed.

4. ROTATION DETECTOR O/P (R00)

Rotation detector function is activated by an internal IC for customer's application.
Electrical schematic:



CUSTOMER'S CIRCUIT

Vcc = From +5 To +28 VDC (Generally use +12 or +24 VDC)
Ic = 5 mA max.
R = V/I (Output "R" value calculation)

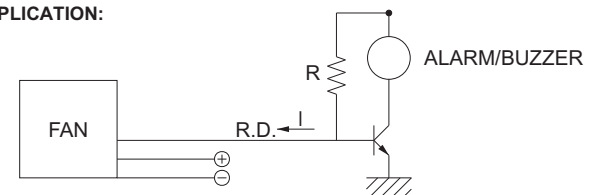
SUPPLY A WAVEFORM:



OUTPUT LEVEL:

High = $V_{cc} \pm 10\%$
Low = 0~0.5V
Ic = 5 mA max.

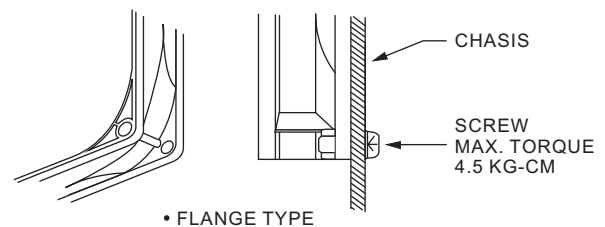
APPLICATION:



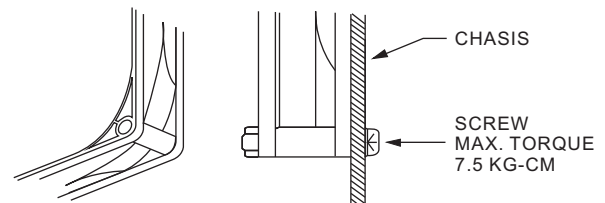
FUNCTION:

By means of waveform & customer's design, schematic can reach alarm function: either in the form of buzzing or LED flashing.

5. FRAME TYPE:



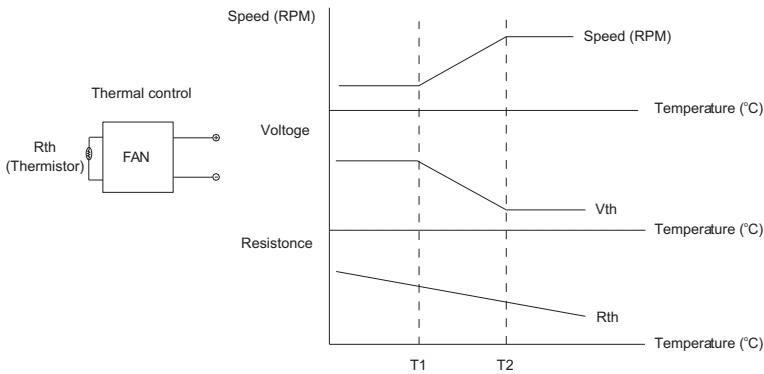
• FLANGE TYPE



• RIB TYPE

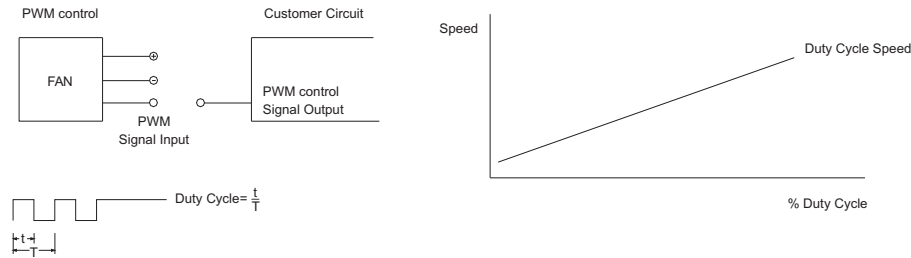
6. TEMPERATURE CONTROL : "SENSFLOW"

With temperature controlled fan, the RPM can be controlled by on board or off board thermistor. The RPM and temperature range is subject to custom request.



7. PWM CONTROL

In PWM speed control, a fixed frequency square wave is applied to the speed control lead wire of the fan. The ratio of the on time vs. the PWM period is proportional to the RPM.



■ PWM INPUT VOLTAGE RANGE:

High level= 2.8 to 20 VDC
Low level= 0 to 0.4 VDC

■ PWM INPUT CURRENT (IPWM) RANGE:

40uA to 20mA

To control signal line of the fan shall be able to accept a 30Hz to 30kHz.
The preferred operating point for the fan is 0%~100% of duty cycle.