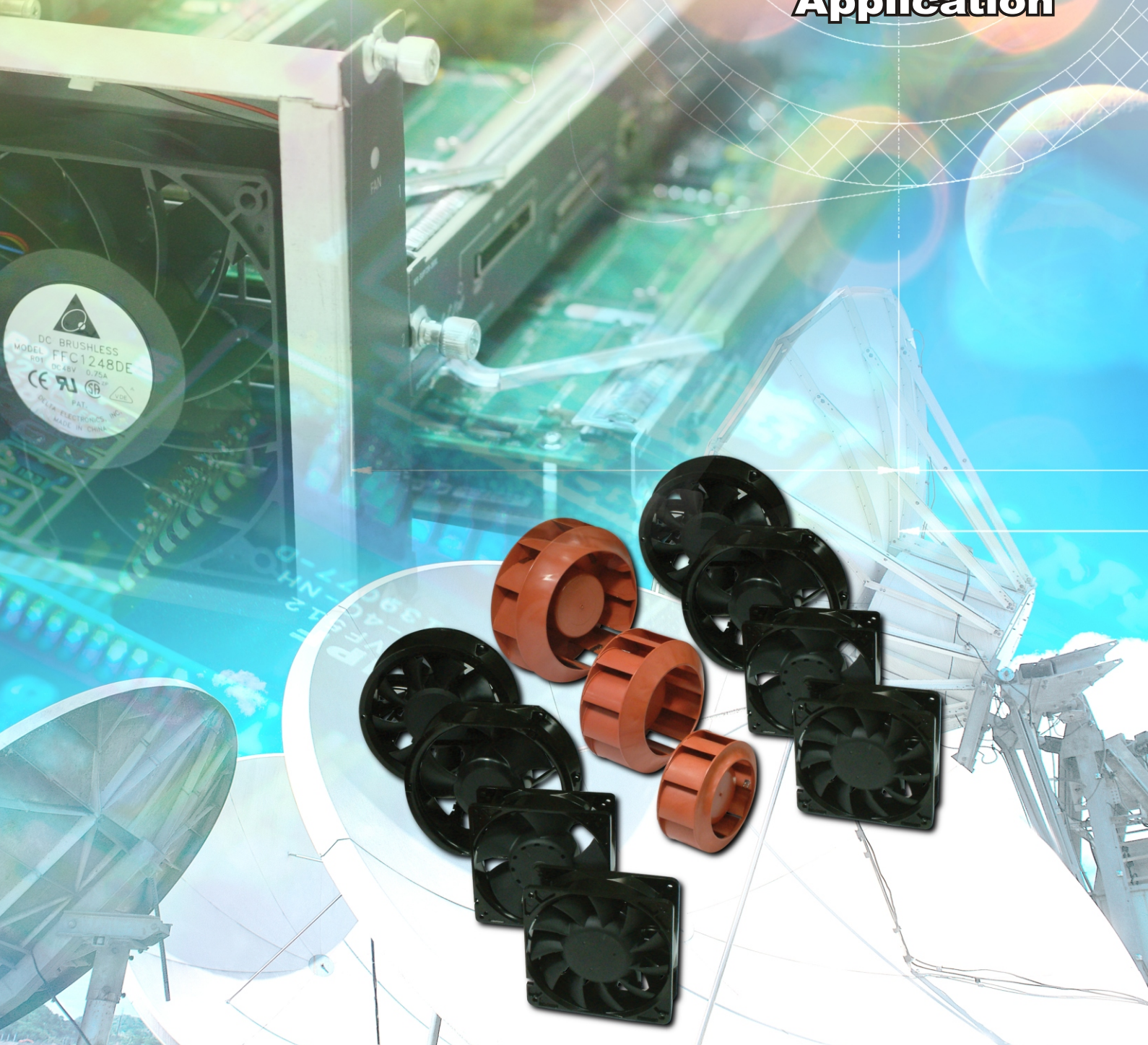


公司：昆山达瑞美电子有限公司  
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# Air Cooling Fan Telecommunication Application





# Introduction



Manufacturing Plant 2 in Taoyuan, Taiwan

More than 17 years Delta has gained industry's recognition, confidence and commendation by continuously offering innovative quality brushless DC air cooling products. Broad product range covers axial fan from 25mm-200mm, blowers from 30mm-175mm, cross-flow fans and slim blowers. In combine with patented distinctive blade design, innovative structure design and "Sensflow" control not only greatly increase cooling performance but also reduce system noise with temperature sensor control when the fan is in low load operation. Fans with hot-swap construction, fan trays and modules with strong pan and first-rate efficiency are also produced.

## Product Research & Development

Innovations are everywhere in our products. Engineering expertise backed by sophisticated test

instruments and equipment gives Delta very strong design capability. Advanced engineering equipment such as Star-LT simulation software, computerized CNC machines, semi-anechoic chambers and wind tunnels are used to develop high performance, low noise and cost effective products.

## Quality Assurance

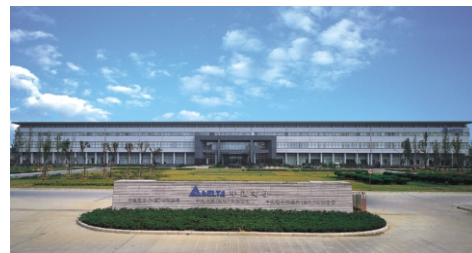
Delta is an ISO-9001 and TS-16949 certified manufacturer for brushless DC air cooling products. We implement strict reliability tests in the design stage and have put into place Statistical Process Controls at each production process.

## Manufacturing

Delta's automation department is highly specialized in computerized state-of-the-art equipment. We build our own fully automated production lines in-house. This allows us to provide large production capacity and high quality, cost effective products to our customers.

## Global Operations

A worldwide network of sales and technical support teams is available to our customers in Asia, USA and Europe. These teams are assisted by local design-engineering centers. Delta Group is utilizing a SAP R/3 system to facilitate and optimize its linkage with customers and suppliers, allowing it to effectively monitor and maintain its world-wide logistics operations.



Manufacturing Plant in Wujiang, China



Manufacturing Plant in Dongguan, China



Manufacturing Plant in Bangkok, Thailand

# Evaluation Facilities

## ISO 3745 Anechoic Chamber

Noise Chamber:

Residual background noise

Level : 10.0 dB(A)

Lowest cutoff frequency:

80 Hz

Room Volume: 5.2m x 5.0m x 3.2m

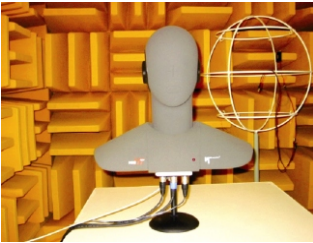
Instrument: HEAD acoustics

System impedance noise measurement :

ISO 10302 International standard



Sound Power



Sound Quality



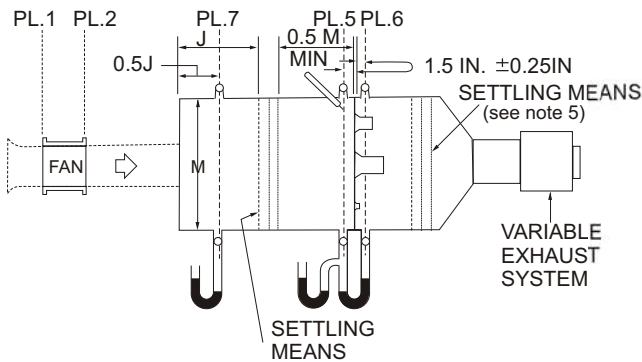
Sound Pressure



Wind Tunnel

Static Pressure Range: 0 ~ 100 & 127 mmH<sub>2</sub>O

Air Flow Rate Range: 10 CFM, 20 CFM, 200 CFM, 250 CFM, 1000 CFM, & 3000 CFM.



## Waterproof fan

Currently, many customer system applications in telecom and other industries are for outdoor or relatively harsh environments. Waterproof and dustproof fans are required under these conditions.

In accordance with IEC60529 and the development and design for fan motor assembly protection, Delta has the capability to produce IP55 level fans. Delta production has already installed equipment to meet IEC & NEBS conditions as well as additional functional testing for other customer requirements.



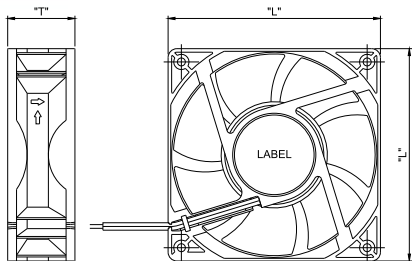
IPX5



IP5X



# Telecommunication Fans



Axial fan

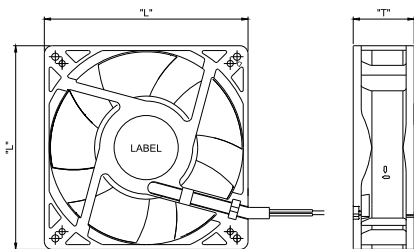
Impeller : Plastic

Frame : Plastic

Model	Dimension	Rated Voltage	Operating Voltage Range	Max. Speed	Rated Input Power	Max. Air flow	Max. Air pressure	Noise
Part No.	L x L x T (mm)	VDC	VDC	RPM	Watt	CFM	IN H <sub>2</sub> O	dB-A
AFB06X-A	60 x 60 x 25.4	24 / 48	14 to 27.6 / 28 to 56	6800	5.76 / 6.72	38.35	0.544	46.5
AFB06XE	60 x 60 x 38	24	14 to 27.6	8000	9.12	46.17	0.793	50.0
FFB06XE	60 x 60 x 38	24	14 to 26.4	8000	11.16	50.15	0.972	54.5
AFB08X	80 x 80 x 25.4	24 / 48	14 to 26 / 28 to 56	4000 / 3250	3.84 / 3.84	46.62 / 37.43	0.267 / 0.181	40.0 / 34.0
FFB08XE	80 x 80 x 38	24 / 48	14 to 26.4 / 28 to 56	5700 / 4900	12.00 / 7.68	80.16 / 68.51	0.812 / 0.591	52.5 / 48.5
PFB08XE	80 x 80 x 38	24	14 to 26.4	9000	32.40	132.56	2.030	65.0
GFB08XG	80 x 80 x 50.8	24	14 to 27.6	4200	8.88	68.58	0.445	53.0
AFB09X	92 x 92 x 25.4	24 / 48	14 to 27.6 / 28 to 56	3800 / 3200	5.28 / 3.84	67.80 / 57.92	0.302 / 0.221	45.0 / 38.0
FFB09X	92 x 92 x 25.4	24 / 48	14 to 27.6 / 28 to 53	3700	7.44 / 8.16	81.97	0.319	48.2
FFB09XE	92 x 92 x 38	24 / 48	14 to 27.6 / 28 to 53	4800 / 4400	12.00 / 9.60	110.18 / 100.29	0.665 / 0.572	55.0 / 52.5
PFB09XE	92 x 92 x 38	24 / 48	14 to 26.4 / 28 to 56	8000 / 7000	34.80 / 28.80	175.03 / 153.52	1.819 / 1.440	66.5 / 64.0
GFB09XG	92 x 92 x 50.8	24 / 48	14 to 27.6 / 28 to 56	3700	14.40 / 15.36	91.82	0.505	59.0
AFB12X	120 x 120 x 25.4	24	14 to 27.6	3400	6.72	113.11	0.430	46.5
FFB12X	120 x 120 x 25.4	24 / 48	14 to 26.4 / 28 to 53	4000	15.12 / 15.36	150.33	0.489	56.4
EFB12XF	120 x 120 x 32	24 / 48	7 to 26.4 / 28 to 56	4400	10.56	139.85	0.563	55.5
AFB12XE	120 x 120 x 38	24 / 48	7 to 27.6 / 28 to 56	3700 / 3200	12.00 / 8.64	151.85 / 129.96	0.571 / 0.420	53.0 / 48.0
EFB12XE	120 x 120 x 38	24 / 48	7 to 27.6 / 28 to 56	3700	10.56 / 9.60	141.96	0.520	52.5
FFB12XE	120 x 120 x 38	24 / 48	14 to 26.4 / 28 to 53	4000	24.00 / 24.00	190.00	0.700	59.0
TFB12XE	120 x 120 x 38	24 / 48	18 to 27 / 28 to 53	4600	28.80 / 31.20	220.01	1.041	65.0
PFB12XE	120 x 120 x 38	24 / 48	14 to 26.5 / 30 to 56	5500	48.00 / 48.00	252.85	1.412	66.5
GFB12XG	120 x 120 x 50.8	24 / 48	14 to 26.4 / 28 to 56	3700	43.20 / 32.64	203.41	0.820	67.6
GFB12XW	120 x 120 x 76.2	24 / 48	14 to 26.4 / 28 to 53	3550	29.04 / 29.76	220.29	0.592	59.0
FFB13XE	127 x 127 x 38	24 / 48	14 to 26.4 / 28 to 53	3850	28.80 / 32.16	200.02	0.799	59.5
FFB14XG	140 x 140 x 50.8	24 / 48	14 to 26.4 / 28 to 53	3600	36.72 / 36.96	273.09	0.781	61.7

\* The model name "X" letter means rotation speed that will be different for various models

\* The max. air flow and the speed are measured in free air; max. air pressure is measured at zero air flow



Axial fan

Impeller : Plastic

Frame : Metal

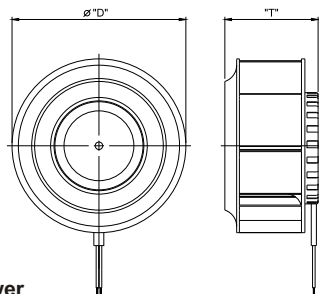
Model	Dimension	Rated Voltage	Operating Voltage Range	Max. Speed	Rated Input Power	Max. Air flow	Max. Air pressure	Noise
Part No.	L x L x T (mm)	VDC	VDC	RPM	Watt	CFM	IN H <sub>2</sub> O	dB-A
FFB12XE-M	120 x 120 x 38	24 / 48	14 to 26.4 / 28 to 54	6300	78.00 / 79.20	264.62	1.705	73.5
FFB14XE-M	140 x 140 x 38	24 / 48	14 to 26.4 / 36 to 53	5500	80.40 / 86.40	367.62	1.644	74.0
AFB15X	172 x 150 x 25.4	24 / 48	12 to 30 / 24 to 60	3200	14.88 / 14.88	214.85	0.524	53.5
AFB17X	172 x 25.4	24 / 48	12 to 30 / 24 to 60	3200	14.88 / 14.88	214.85	0.524	53.5
EFB15XG	172 x 150 x 50.8	24 / 48	12 to 28 / 24 to 60	4300 / 4000	28.08 / 23.52	325.00 / 302.29	1.083 / 0.937	63.0 / 60.0
EFB17XG	172 x 50.8	24 / 48	12 to 28 / 24 to 60	4300 / 4000	28.08 / 23.52	325.00 / 302.29	1.083 / 0.937	59.0 / 57.0
FFB17XG	172 x 50.8	48	26 to 54	5000	120.00	450.98	1.837	74.0
FHB12XE-M	120 x 120 x 38	48	32 to 80	5800	61.44	245.83	1.502	71.5
AHB13XE	127 x 127 x 38	48	32 to 80	5500	36.00	255.77	1.448	67.0
FHB14XE	140 x 140 x 38	48	32 to 80	5000	65.28	346.34	1.434	71.0
AHB15X	172 x 150 x 25.4	48	32 to 80	4000	24.96	271.05	0.736	61.0
AHB17X	172 x 25.4	48	32 to 80	4000	24.96	271.05	0.736	61.0
AHB15XG	172 x 150 x 50.8	48	32 to 80	5200	72.96	402.72	1.964	68.5
EHB15XG	172 x 150 x 50.8	48	32 to 80	5200	57.60	374.62	1.703	68.5
AHB17XG	172 x 50.8	48	32 to 80	5200	72.96	408.39	2.048	66.5
EHB17XG	172 x 50.8	48	32 to 80	5200	57.60	394.22	1.761	66.0
FHB17XG	172 x 50.8	48	32 to 80	4400	76.80	388.25	1.395	71.5

\* The model name "X" letter means rotation speed that will be different for various models

\* The max. air flow and the speed are measured in free air; max. air pressure is measured at zero air flow

Specifications are subject to change without notice.

# Telecommunication Blowers



Open blower

Impeller : Plastic

Frame : Metal

Model	Dimension	Rated Voltage	Operating Voltage Range	Max. Speed	Rated Input Power	Max. Air flow	Max. Air pressure	Noise
Part No.	D x T (mm)	VDC	VDC	RPM	Watt	CFM	IN H <sub>2</sub> O	dB-A
KFB10XS	100 x 55	24 / 48	14 to 26.4 / 28 to 53	5700	20.88 / 20.64	111.60	1.393	62.0
KFB17XS	175 x 54	24 / 48	14 to 30 / 28 to 60	4200	55.20 / 55.20	297.39	2.361	73.5
KFB17XT	175 x 69	24 / 48	14 to 26.4 / 36 to 53	3300	69.12 / 69.60	334.79	1.884	67.5
KFB17XT-A	175 x 69	24 / 48	14 to 27.6 / 28 to 53	4000	75.36 / 69.60	412.78	2.403	73.0
KHB10XS	100 x 55	48	32 to 80	6200	21.22	94.96	1.630	66.0
KHB17XS	175 x 54	48	32 to 80	3500	31.20	247.47	1.601	69.0
KHB17XT	175 x 69	48	32 to 80	2700	35.04	251.87	1.209	62.5
KHB17XT-A	175 x 69	48	32 to 80	3100	35.04	335.50	1.448	66.0

\* The model name "X" letter means rotation speed that will be different for various models

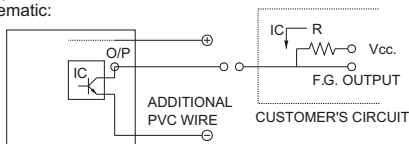
\* The max. air flow and the speed are measured in free air; max. air pressure is measured at zero air flow

Specifications are subject to change without notice.

## FREQUENCY GENERATOR O/P: (F00)

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

Electrical schematic:

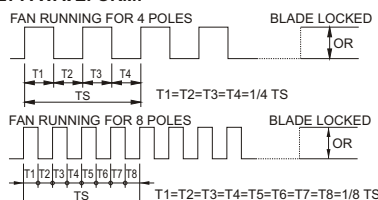


### CUSTOMER'S CIRCUIT

V<sub>cc</sub> = From +5 To +28 VDC (Generally using +12 or +24 VDC)  
 I<sub>c</sub> = 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

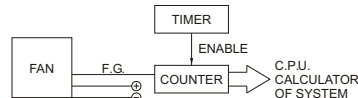
### OUTPUT LEVEL:

High = V<sub>cc</sub>±10%

Low = 0~0.5V

I<sub>c</sub> = 5 mA max.

### APPLICATION:



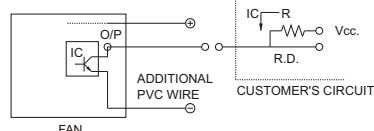
### FUNCTIONS:

- 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.

## ROTATION DETECTOR O/P (R00)

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

Electrical schematic:



### CUSTOMER'S CIRCUIT

V<sub>cc</sub> = From +5 To +28 VDC (Generally use +12 or +24 VDC)  
 I<sub>c</sub> = 5 mA max.

R = V/I (Output "R" value calculation)

### SUPPLY A WAVEFORM:



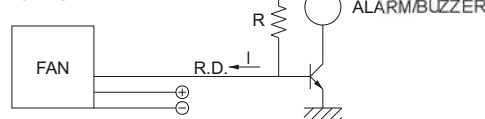
### OUTPUT LEVEL:

High = V<sub>cc</sub>±10%

Low = 0~0.5V

I<sub>c</sub> = 5 mA max.

### APPLICATION:

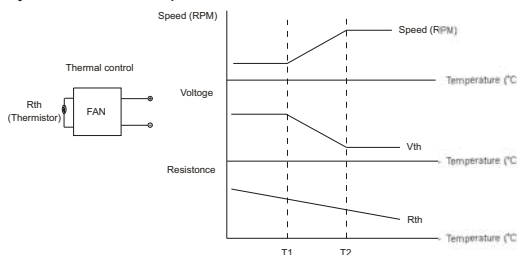


### FUNCTION:

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

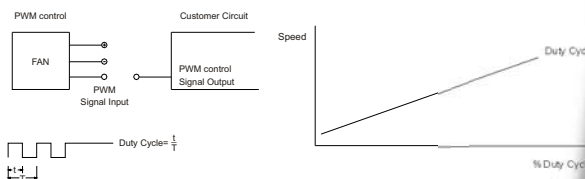
## TEMPERATURE CONTROL : "SENSFLOW"

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.



## 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

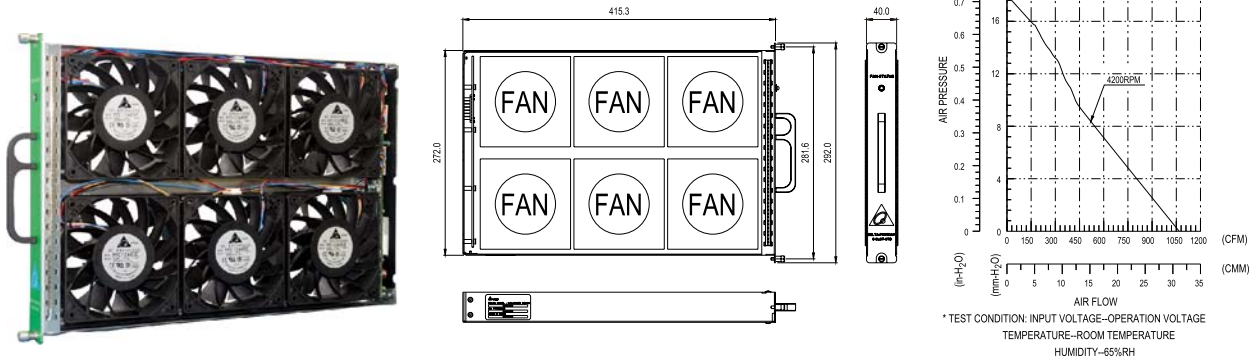
### PWM INPUT CURRENT (IPWM) RANGE:

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.

# Fan Trays

## Delta STD 6 Fan tray Character:



Model	Rated Voltage	Operating Temperature	Speed	Input Current	Input Power	Maximum Air Flow	Maximum Air Pressure	Noise
Part No.	VDC	℃	RPM	Amp	Watt	CFM	IN H <sub>2</sub> O	dB-A
Delta STD 6 fantray	48	-10 ~ +55	4000	2.33	112	1070	0.708	74.5

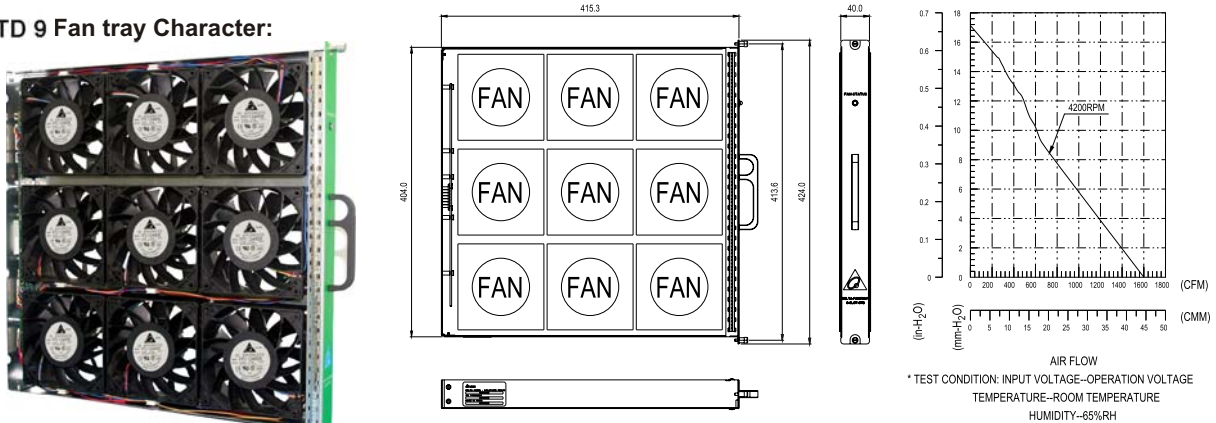
\* The max. air flow and the speed are measured in free air; max. air press sure is measured at zero air flow

Fan Type: 6pcs axial fan

Communication: I<sup>2</sup>C

Advantage: Soft Start, Over Voltage Protection,Over Current Protection, Fan Speed or Temperature Detect,PWM or Voltage Speed Control, Linear Speed Change, Hot Swappable Function, Thermal Fail or Over Temperature Alarm Signal Output,Redundancy Function,Reverse Polarity Protection,Inrush Current Protection,EEPROM,EMC

## Delta STD 9 Fan tray Character:



Model	Rated Voltage	Operating Temperature	Speed	Input Current	Input Power	Maximum Air Flow	Maximum Air Pressure	Noise
Part No.	VDC	℃	RPM	Amp	Watt	CFM	IN H <sub>2</sub> O	dB-A
Delta STD 9 fantray	48	-10 ~ +55	4000	4.68	225	1600	0.669	75

\* The max. air flow and the speed are measured in free air; max. air pressure is measured at zero air flow

Fan Type: 9 pcs axial fan

Communication: I<sup>2</sup>C

Advantage: Soft Start, Over Voltage Protection,Over Current Protection, Fan Speed or Temperature Detect,PWM or Voltage Speed Control, Linear Speed Change, Hot Swappable Function, Thermal Fail or Over Temperature Alarm Signal Output,Redundancy Function,Reverse Polarity Protection,Inrush Current Protection,EEPROM,EMC

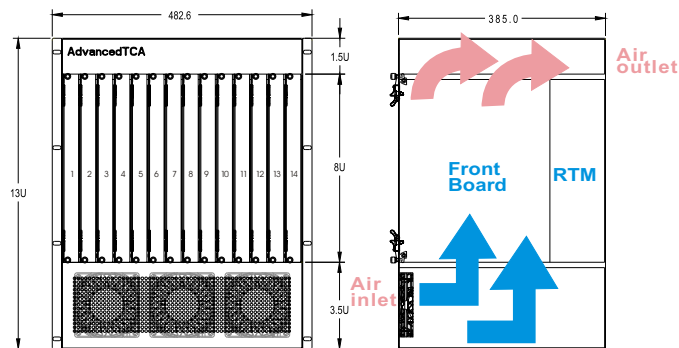
Delta Fan Tray Capability:  
Wide Input Voltage Range:10VDC~75VDC  
Widely Applicative Fan: 12V/24V/48VDC  
Optimal cooling design of heat dissipation  
Flexible Manufacture  
100% Auto Function Testing  
100% Burn In Testing & Monitor Equipment  
Industry & Telecom (Indoor & outdoor)& Networking and other application  
ODM & OEM Design  
Communication: I<sup>2</sup>C ,RS232, RS485  
DC/DC Converter  
Safety Compliance: UL/CUL/TUV/VDE/CE

Specifacations are subject to change without notice.

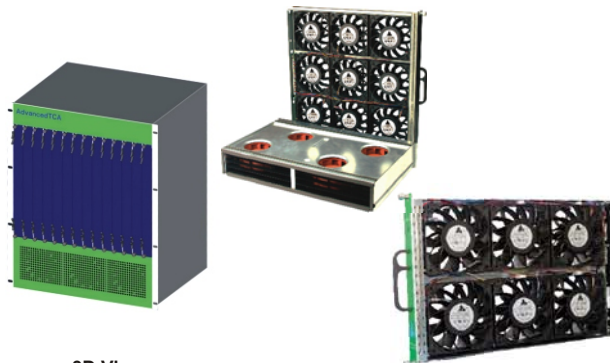


# AdvancedTCA

## AdvancedTCA Fan & Blower Available



ATCA 13U (14 Slot) System



3D View

### Controller Boards

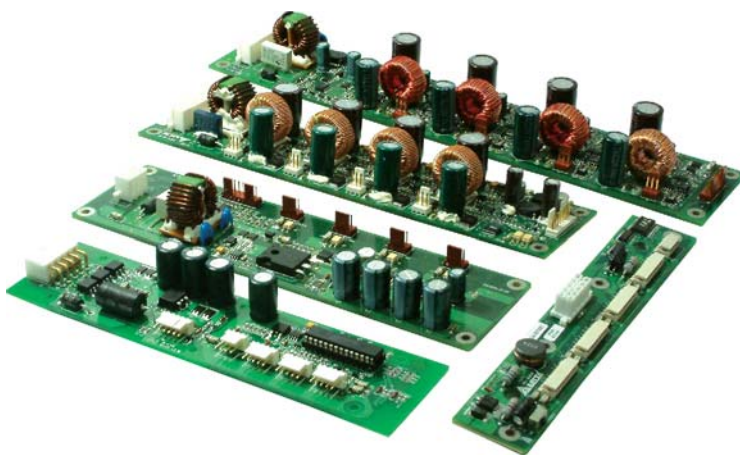
Delta's fan controllers are designed for the telecom industry. This system cooling solution provides an interface with fan speed control.

#### Features

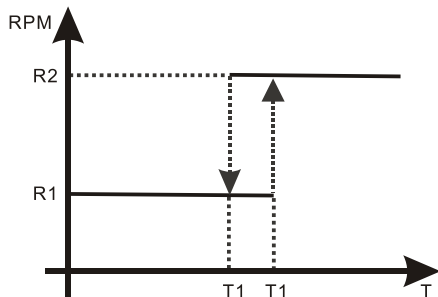
- ◆ Wide Input Range: 10VDC ~ 75VDC
- ◆ Widely Applicative Fan: 12V/24V/48VDC
- ◆ Soft Start Function at Start Up
- ◆ Reverse Polarity Protection
- ◆ Hot-Swap Inrush Current Protection
- ◆ Function Fail Alarm Indication
- ◆ Redundancy Function
- ◆ Over Voltage and Over Current Protection
- ◆ Thermal Detect and Fan Speed Control
- ◆ PWM or Voltage Control Speed
- ◆ Communication Function: I<sup>2</sup>C, RS232...etc
- ◆ Custom Design is Accepted

#### Control Functions

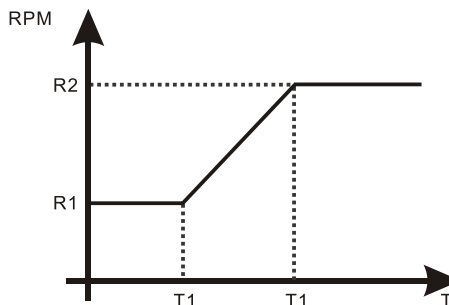
- ◆ Fan Speed Alarm Settings
- ◆ Fan Fail Alarm
- ◆ Multiple Fans Fail Alarm
- ◆ Over Temperature or Thermal Fail Alarm
- ◆ Warning for Insufficient Input Power.
- ◆ RPM VS Temperature: Two Modes of Speed Control are Applied.



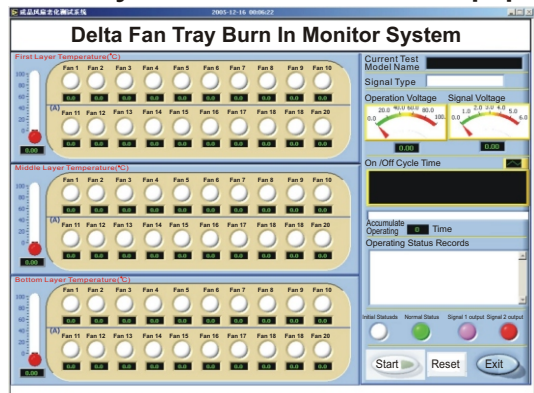
#### Step Mode.



#### Linear Mode.



## Fan Tray Production Auto Test Equipment



Burn In Monitor Equipment



Auto Test Machine: Function, Waveform, Inrush Current, LED, Fan Speed Detector, Others