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Alphacool ES 120mm 1.000-4.000rpm Fan V1.1 (120x120x25mm) - Two Ball Bearing - PWM

Alphacool article number: 24860

Quick Info

The Alphacool ES fans have been specially developed for use in servers and workstations and, unlike usual, do not offer a 2 or 3-pin DC power connection, but a 4-pin PWM control.

- High speed fan with 1000 to 4000rpm
- Double ball bearing
- High airflow

Scope of delivery

1 x ES 120 mm fan

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Technical data

Dimensions	120 x 120 x 25 mm
Bearing type	Two ball bearings
Rated voltage	12 V DC
Operating voltage	7-14 V DC
Start-up voltage	7 V DC or lower at 25 °C
Rated current	0.53 A; maximum 0.67 A
Rated power	6.36 W; maximum 8.04 W
Rated speed	4000 rpm ±10%
Maximum airflow	119.80 CFM
Maximum static pressure	12,67 mm H2O
Noise level	49.5 dB(A); maximum 51.5 dB(A), measured at rated voltage from 1 m in a quiet room with background noise below 18 dB(A)
Expected service life	70,000 hours at 40 °C
Motor poles	4
Rotation direction	Anticlockwise
Integrated functions	FG tachometer output, Automatic restart, Soft start, PWM speed control
Ingress protection	IP22
Locked-rotor protection	The fan switches off automatically 1-3 seconds after a rotor lock at rated voltage. It then attempts to restart every 2-6 seconds. No damage is specified after 72 hours in the locked condition.
Reverse-polarity protection	Open-circuit protection when VCC and GND are exchanged
Insulation resistance	At least 10 MOhm at 500 V DC between the housing and both lead wires
Dielectric strength	500 V AC for 1 minute at 1 mA between the housing and both lead wires
Main materials and connection (frame, impeller, bobbin)	PBT, UL 94 V-0
Main materials and connection (lead wires)	UL 1007, 26 AWG, 300 ±10 mm, excluding connector
Main materials and connection (connector)	2510-4P
Operating range	-10 to +70 °C; 15-90% RH
Storage range	-20 to +85 °C; 15-90% RH
Model designation	JE1225B12V

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Product pictures	24860_Alphacool_ES_120mm_1.000-4.000rpm_Fan__V1.1_(_120x120x25mm_)_-_Two_Ball_Bearing_-_PWM_pics.zip
EU-DoC / CE / RoHS	Alphacool_EuDoc_CE_RoHS_24860.pdf

Packaging dimensions per unit

L x W x H	125 x 130 x 30 mm
Weight	220 g

Other data

Certificates	CE, FC, RoHS
EAN	4250197135764
Customs code	84145915000
Guarantee	3 years

Article text

The Alphacool ES fans have been specially developed for use in servers and workstations and, unlike usual, do not offer a 2 or 3-pin DC power connection, but a 4-pin PWM control.

PWM control

Instead of the usual 2 cables or the 3-pin connector Alphacool now also uses a 4-pin PWM connector for enterprise fans, which is supported by more and more server mainboards. Via the 4-pin PWM connector, the fan always receives full voltage and is controlled by pulse width modulation. This allows the fan to be controlled over a much wider speed range. A considerable amount of energy can be saved whilst controlling the fans in server racks and with 0% PWM control, the fans can even be stopped completely. The fan also offers a soft start, which increases the service life of the fan and reduces the risk of injury. At speeds of several thousand revolutions per minute, no parts of the body should get between the fan blades.

Double ball bearings

Unlike classic plain bearing, Alphacool ES fans have a double ball bearing for increased service life under full load. Double ball bearings are generally regarded as the highest quality bearings in terms of durability and quality. This also ensures a high level of running smoothness in terms of minimal vibration.

Protection circuits

All Alphacool Enterprise fans have multiple protection circuits. If the fans are blocked, they automatically try to restart at re-duced speed after a few seconds. Thanks to the soft start, including the emergency start function, the fan can be blocked for up to 72 hours without suffering damage. In case of wrong polarity when connecting the fan, a burn-out of the electronics for at least 5 seconds is impossible. If the fan is connected incorrectly for a short time, this is no problem. The Alphacool ES fans for servers and workstations offer an extremely high air flow and an extremely high static pressure. They are therefore ideal for use on radiators or as particularly powerful case fans.

Figure (1)

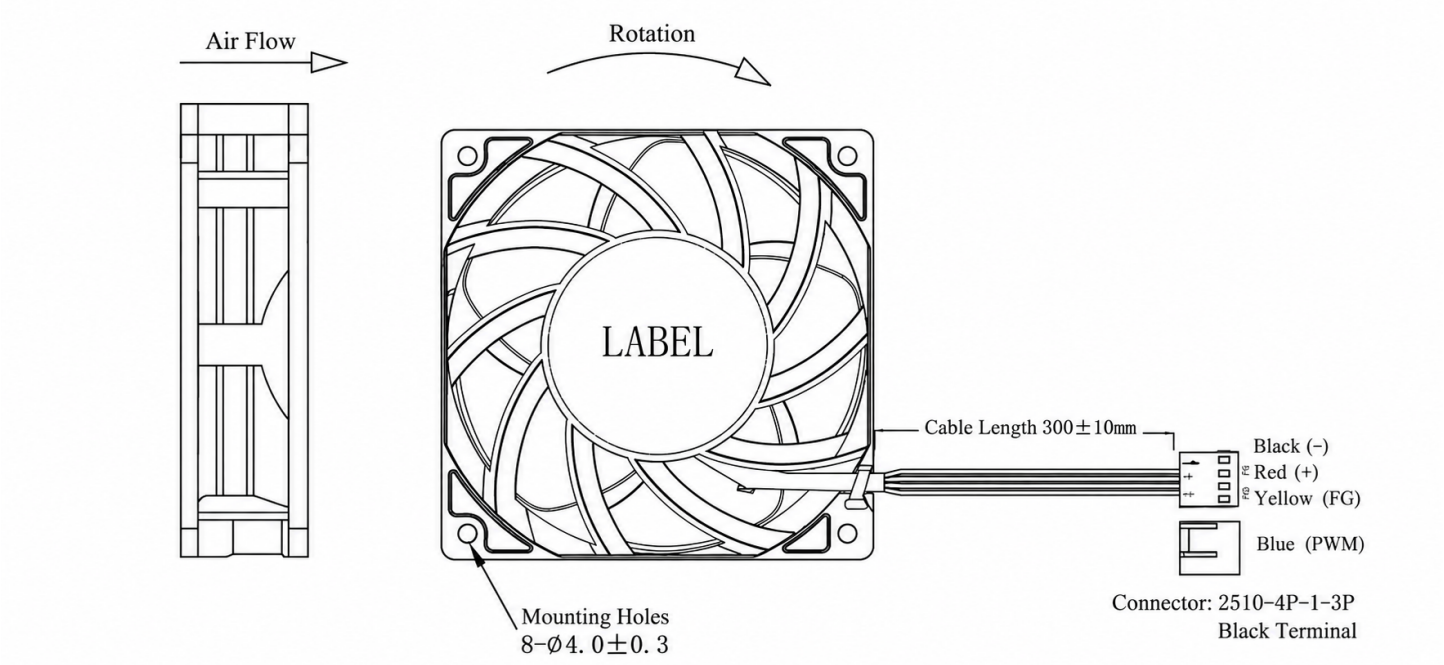
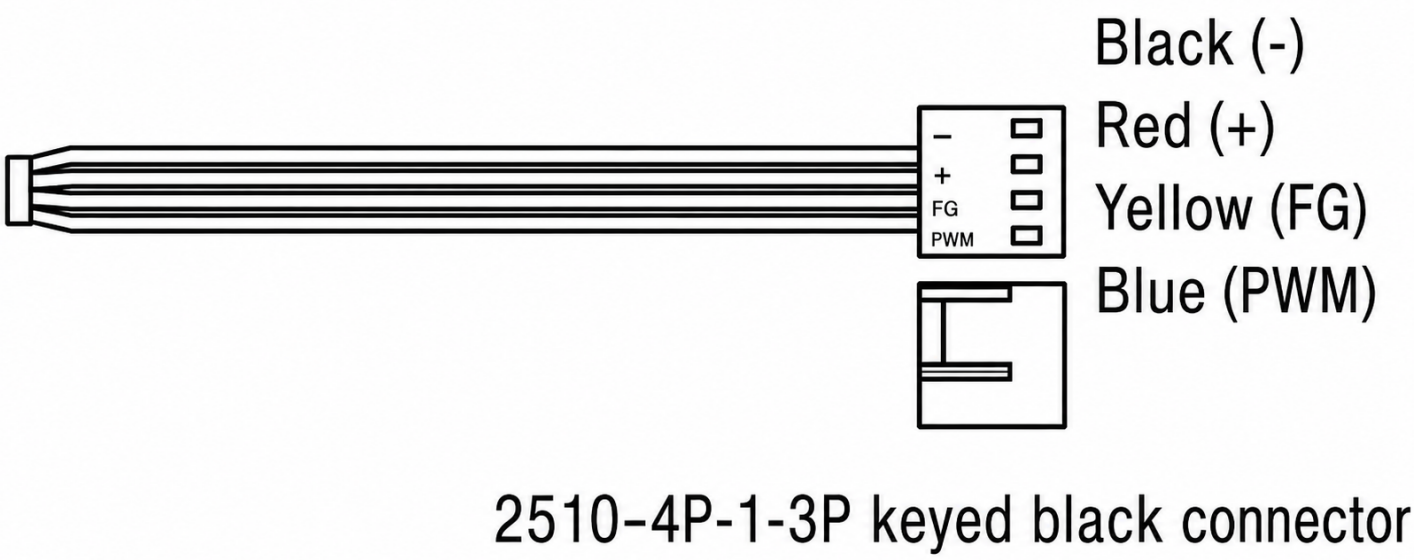


Figure (2)



2510-4P-1-3P keyed black connector

Figure (3)

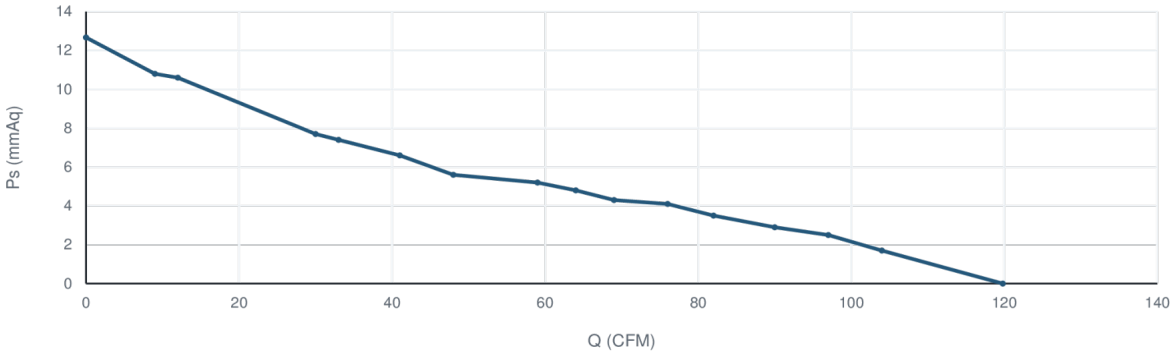
Technical data

Alphacool Core 120 mm fan PWM 4000 rpm | Model JE12025B-12V-4000RPM

5. P-Q Characteristic Curve Test

Test conditions and methods		
Testing method	Constant voltage	
Barometric pressure	752.4 mmHg	At rated voltage
Relative humidity	66.825%	Temperature: 25 °C
Test data	Max. Ps: 12.67 mmAq	Max. flow rate: 119.80 CFM

P-Q Curve



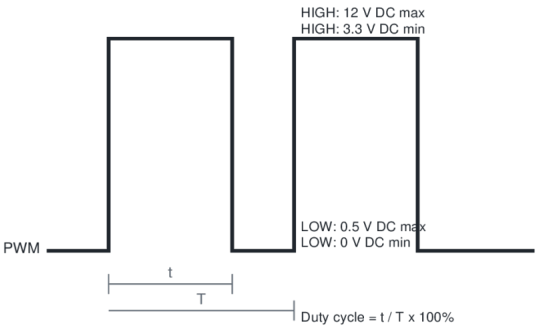
6. PWM vs RPM Curve

6.1 Curve indication

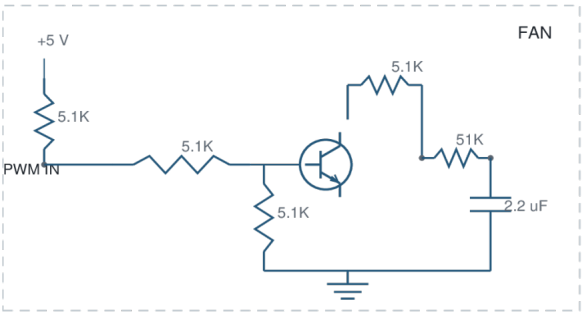
PWM = 0%	0 RPM
PWM = 100%	4000 RPM +/- 10%

6.2 PWM control signals

PWM control waveform



Standard PWM interface circuit



6.3 Input PWM frequency range: 300 Hz to 30 kHz

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Figure (4)

Technical data

Frequency generator (FG) speed signal | Model JE12025B-12V-4000RPM

7. Frequency Generator (FG) Signal

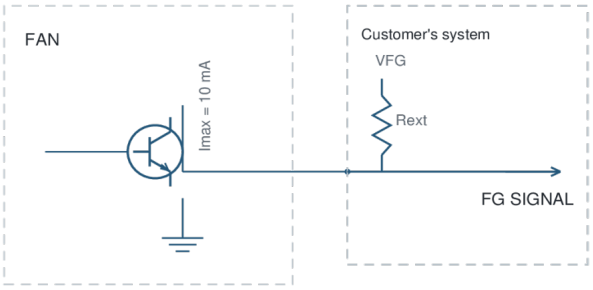
When the fan is running, the rotor poles N and S switch the output between high and low levels. The switching frequency increases with fan speed, allowing the fan speed to be determined from the FG signal frequency.

7.1 FG output circuit - open-collector mode

7.2 Specifications

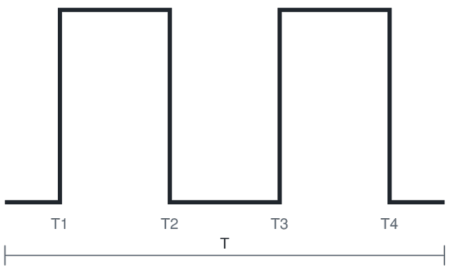
VFG	Rext (minimum)	Imax	Vce
15 V max	VFG / Imax	10 mA	0.5 V max

Open-collector FG output circuit



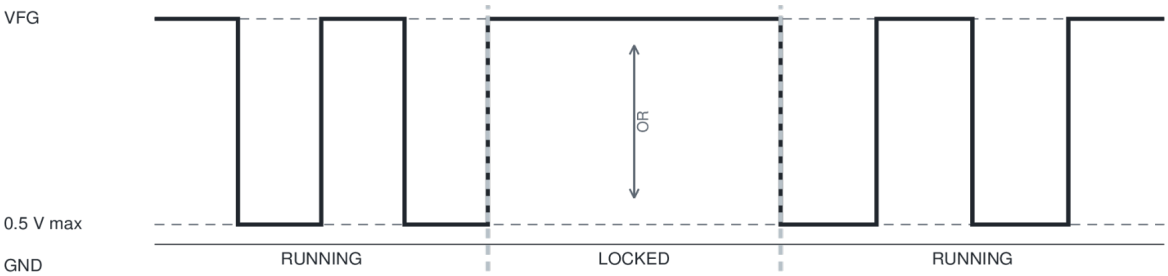
Fan running - 4 poles

T1 = T2 = T3 = T4 = T / 4



7.3 RPM = 60 / T

Frequency generator waveform



7.5 The FG signal lead must not come into contact with either the positive (+) or negative (-) power lead.

7.6 The signal lead must not come into contact with either the positive (+) or negative (-) power lead.

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Figure (5)

Technical data

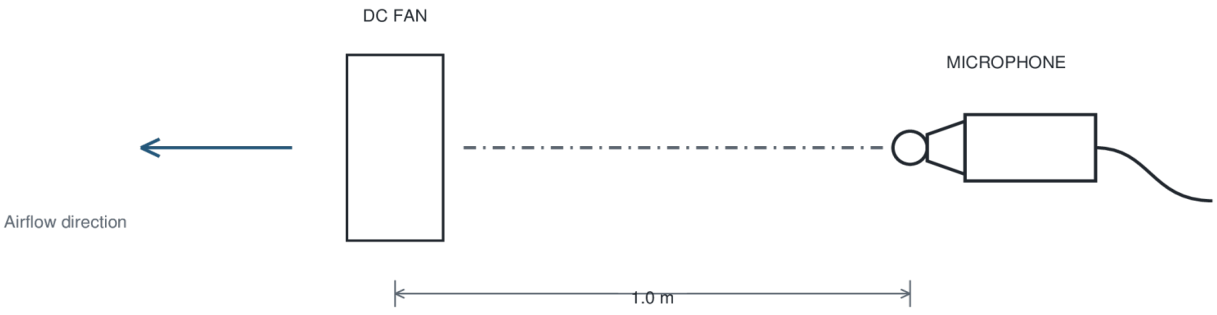
Noise test conditions, method and result | Model JE12025B-12V-4000RPM

8. Noise Test

Test conditions	Test method
1. Temperature: 26 °C	1. Test position: 180°
2. Humidity: 62% RH	2. Test distance: 1.0 m from the fan intake
3. At rated voltage	3. Background noise: 14.8 dB(A)
4. At rated speed	4. Test performed in accordance with ISO 3745
Test equipment: AWA6290M dual-channel acoustic analyzer	
Test result: Leq = 51.5 dB(A)	

8.1 Schematic Diagram of the Noise Test Method

Noise test arrangement



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