

High Performance Blowers

TYPICAL APPLICATIONS

- Pressure management mattresses
- Medical ventilators
- Vacuum systems
- Low noise, high pressure applications
- Smoke extraction

FEATURES

- 24 VDC input, 12 VDC option available
- Open collector tach output, weak pull-up on board
- 0 - 5 V or PWM input speed control
- Internal drive electronics
- High efficiency 3-phase brushless DC motor

BENEFITS

- Low noise
- High efficiency
- Integrated electronics with customizable system interface
- Variable speed
- High power density
- High pressure
- Long life
- Smallest in the industry
- ESD protection
- External drive version possible
- Low inertia

AMP45



The Moog AirMax™ P45 series of fans and blowers provides excellent output power per unit volume through the use of compact, high energy 3-phase brushless DC motors and efficient airfoil design. The motor utilizes high energy rare earth magnets to provide the blower with the necessary torque to provide maximum airflow in the minimum amount of system space.

These high efficiency compact air movers use high reliability, long-life ball bearings with specially formulated lubrication to extend the life without the need to re-lubricate.

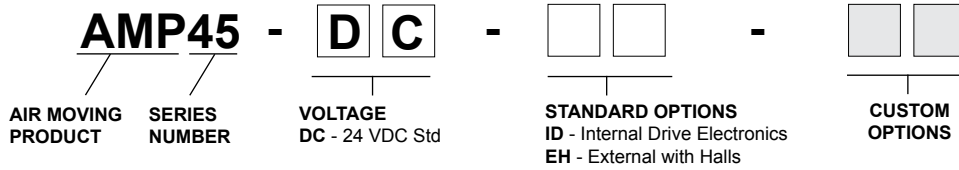
For more information about how this product can be tailored to fit your specific application, contact our applications engineers.

MOOG

High Performance Blowers

SPECIFICATION AND NUMBERING SYSTEM

Part Numbering System Guide



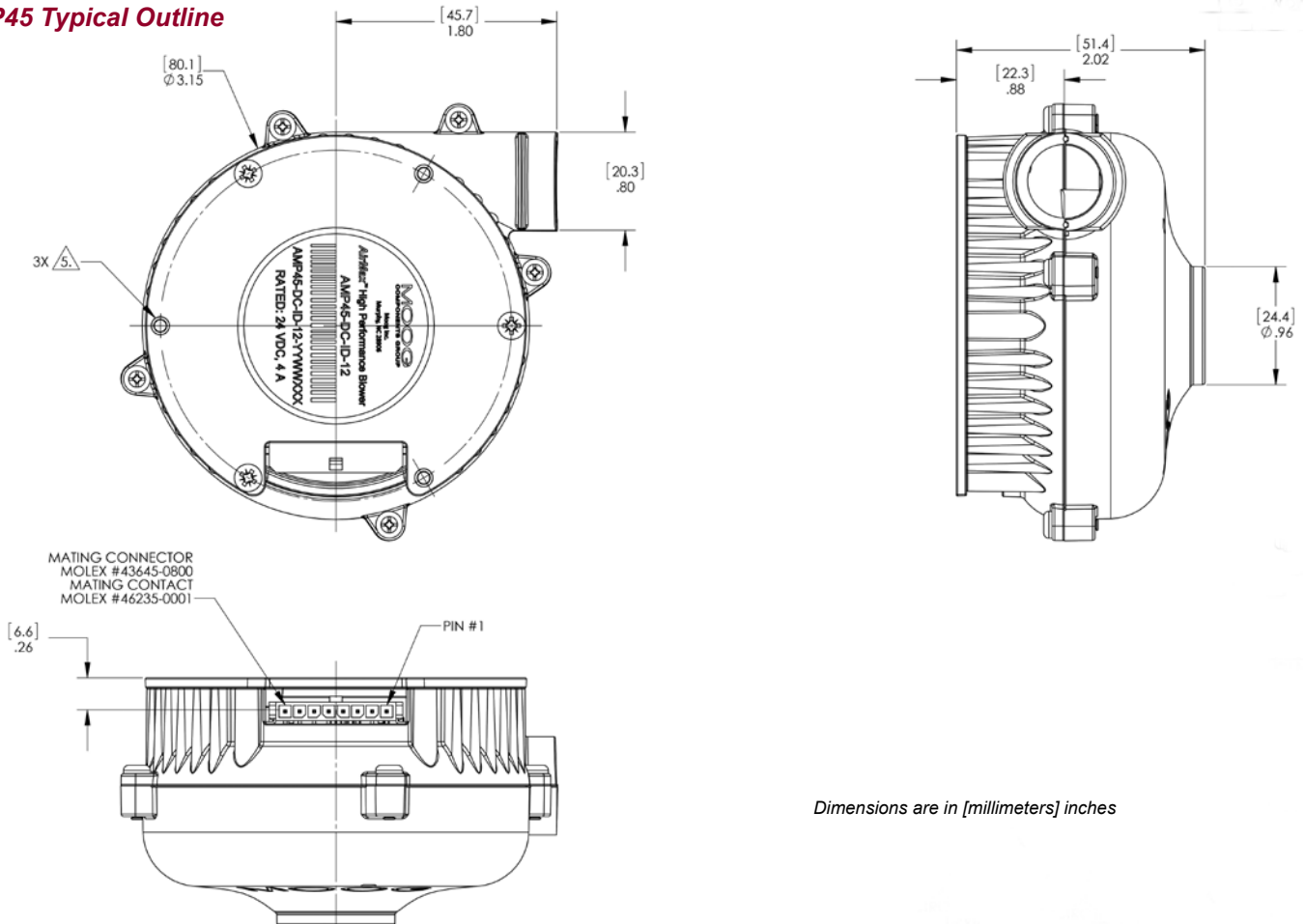
AMP45 SPECIFICATIONS

| Parameter | Units | Value |
|-----------------------|-----------|------------|
| Input Voltage | VDC | 24 +/- 10% |
| Operating Temperature | Degrees C | 0 - 50 |
| Weight | lbs / kg | .7 / 310 |

Timing Diagram for EH Option (4 Pole) CCW Rotation

| DEGREES | ELEC | | | | | | | | | | | | |
|---------|---|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 0 | 60 | 120 | 180 | 240 | 300 | 360 | 60 | 120 | 180 | 240 | 300 | 360 |
| | MECH | | | | | | | | | | | | |
| | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 |
| S1 OUT | [Timing diagram showing pulse sequence] | | | | | | | | | | | | |
| S2 OUT | [Timing diagram showing pulse sequence] | | | | | | | | | | | | |
| S3 OUT | [Timing diagram showing pulse sequence] | | | | | | | | | | | | |
| A COIL | - | 0 | + | + | 0 | - | - | 0 | + | + | 0 | - | |
| B COIL | + | + | 0 | - | - | 0 | + | + | 0 | - | - | 0 | |
| C COIL | 0 | - | - | 0 | + | + | 0 | - | - | 0 | + | + | |

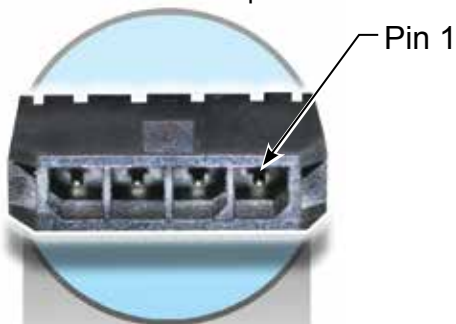
AMP45 Typical Outline



High Performance Blowers

Pin Arrangements

ID - Internal Drive Option

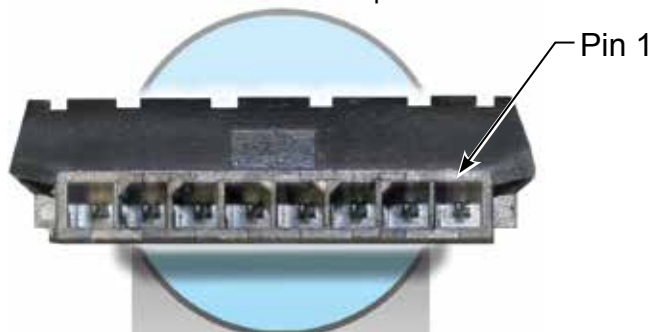


4-Pin Mating Connector - Molex® # 43645-0400*
Refer to page 4 for electrical interface details

4-Pin Connection Table

| Pin Number | Function |
|------------|---------------|
| 1 | Tach Out |
| 2 | V Speed, 0-5V |
| 3 | Return |
| 4 | +24V |

EH - External Drive Option



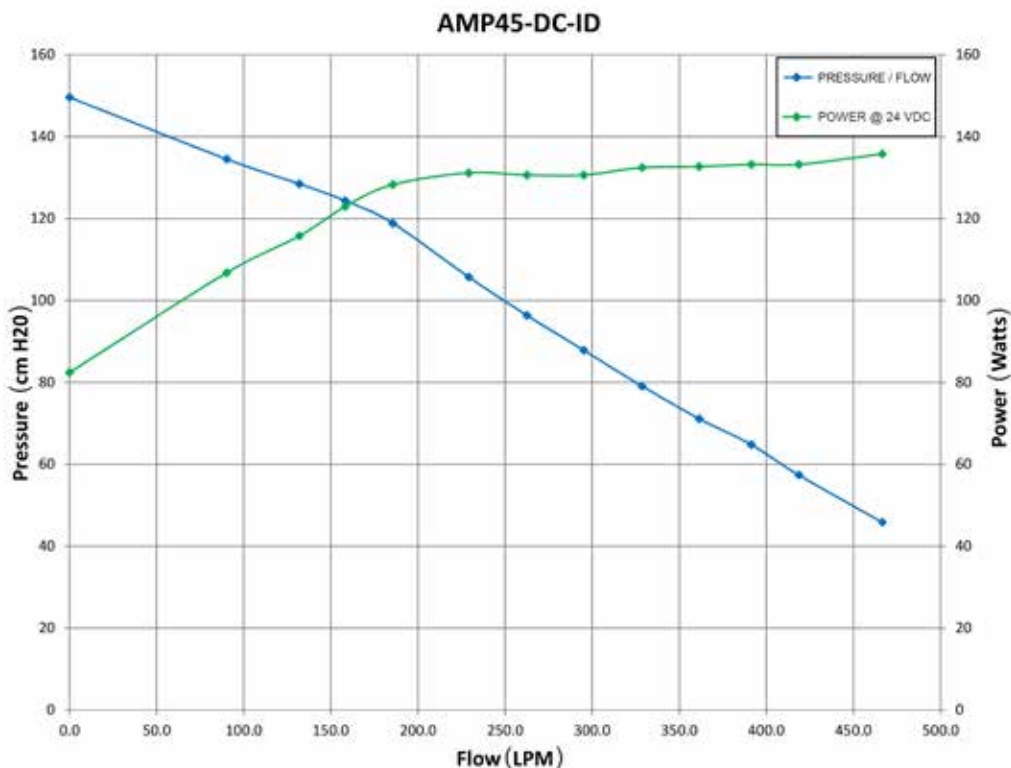
8-Pin Mating Connector - Molex® # 43645-0800*

8-Pin Connection Table

| Pin Number | Function |
|------------|----------|
| 1 | Hall PWR |
| 2 | Hall RTN |
| 3 | S1 |
| 4 | S3 |
| 5 | S2 |
| 6 | C |
| 7 | B |
| 8 | A |

*Molex® Contact: 43030-0001-Tin or 46235-0001-Au

AMP45 Performance Curves



AMP45-DC-ID Electrical Interface

The AMP45-DC-ID is a fully integrated, single stage blower capable of producing up to 45 cm H₂O of pressure and delivering up to 20 ft³/min. There are a variety of possible configurations for powering and controlling the unit described herein.

Basic Specifications

| | |
|------------------------|---------------|
| Supply Voltage | 10.5 V - 30 V |
| Supply Current | 0 A - 5 A |
| Pulses/Rev | 2 |
| Maximum Speed | 60,000 RPM |
| Maximum Tach Frequency | 2 kHz |
| Speed Control Range | 0 V - 5 V |

Physical Interface

The AMP45-DC-ID has a 4-pin connector. Two of the pins are for power and two are for signal. Moog recommends Molex® part number 43645-0400 using contacts 43030-0038 and 18 AWG wire for the V+ and V- leads. A smaller gauge wire may be utilized for the signal leads.

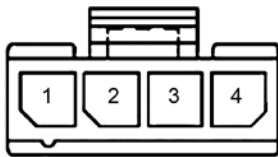


Figure 1

The power supply must be connected between V+ and V-. The speed control voltage and tachometer signals are measured with reference to V-.

| Pin Number | Function |
|------------|-----------------|
| 1 | Tach Out Signal |
| 2 | V Speed |
| 3 | V- |
| 4 | V+ |

ESD

The TACH and V+ lines are protected from ESD events using components specifically designed for ESD suppression. Passive techniques protect V Speed from ESD events. As a result of this ESD suppression, it is important for the customer to note that operation above 30 V is NOT recommended and will result in damage to the blower.

Power

Pins 4 and 5 are the primary power pins of the unit. The power interface should be designed with the capacity to handle the rated 5 A potential current draw of the AMP45-DC-ID. The recommended connector interface is sufficient for ensuring low impedances at the connection points. Additionally, a short harness length and large gauge wires are encouraged in order to reduce impedances and losses during operation.

Tachometer Signal

The tachometer signal output is in the form of an open-collector output. The output is pulled-up to 3.3 V through a 100 kΩ resistor. This output may be pulled up to any voltage up to 30 V. If voltage is pulled up to a different voltage, then it is recommended to use a resistor value of 10 kΩ or less.

There are two pulses per revolution. The RPM may be calculated using the relationship defined by

$$\text{RPM} = \text{freqInHz} \times 30$$

The signal must be connected to a high-impedance input in order to remain TTL-compatible.

An example arrangement is shown in Figure 2. The internal 100 kΩ resistor is shown pulled up to 3.3 V. The customer-side connection shows the tach pulled up to 12 V through a 10 kΩ resistor.

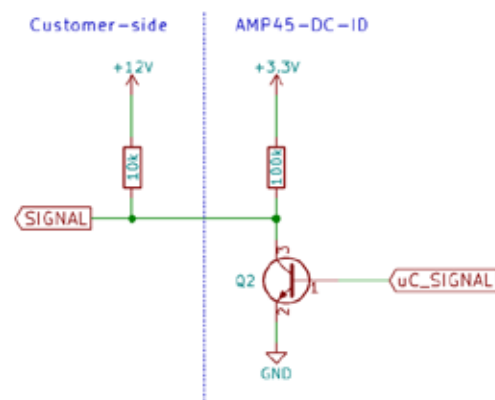


Figure 2

In cases in which isolation is required on the tachometer, a slightly more complex arrangement, demonstrated in Figure 3, may be required.

AMP45-DC-ID Electrical Interface

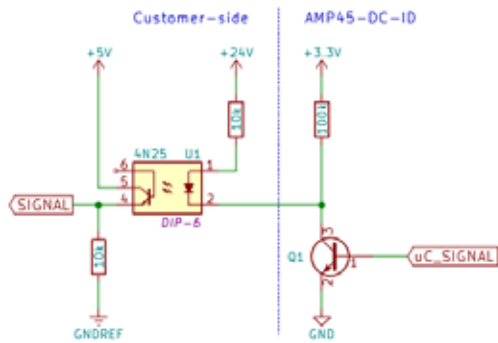


Figure 3

Care must be taken when choosing the optocoupler and resistor values in order to maintain the frequency response of the circuit while also operating within the saturation region of the optocoupler.

Speed Control

The speed control input may be operated in a variety of ways to provide maximum flexibility. At its most fundamental, 0 V results in 0% duty cycle while 5 V or greater results in 100% duty cycle being applied to the motor.

Single Speed/Duty Cycle

The simplest connection is the speed control which is simply attached to the power connection.



Figure 4

This connection will result in 100% duty cycle when the unit is powered up. Another variation on this connection is to apply a resistor in series with the speed control. This can be a low-wattage resistor.

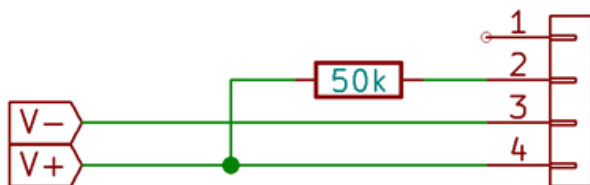


Figure 5

To determine the initial set point, one might model the input impedance as a 30 kΩ resistance. When a voltage of 5.0 V is present on the V Speed pin, then the duty cycle will be 100%.

A simple procedure for determining the correct value for the input resistance is to attach a variable resistor of 100 kΩ and adjust until the desired duty cycle is achieved. Power down the circuit and measure the resistance across the resistor in order to determine the correct value to achieve the desired duty cycle.

Variable Speed/Duty Cycle

The speed control is designed to take an analog or PWM voltage to control the duty cycle. The simplest control is simply to apply a continuous voltage through a buffer or similar output with a low output impedance characteristic. The duty cycle applied to the motor is proportional to the voltage applied up to 5.0 V, with reference to the V- pin.

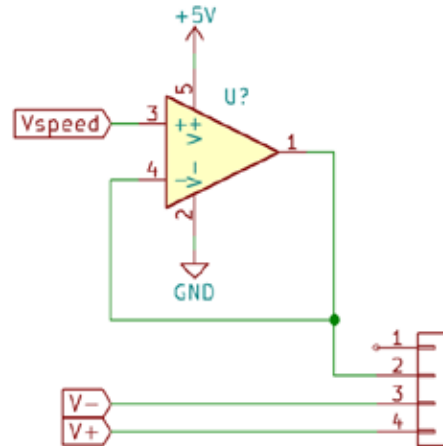


Figure 6

PWM may also be utilized to control the duty cycle applied to the motor. Figure 7 shows a configuration which provides isolation between the blower and the PWM signal. The minimum recommended frequency is 1 kHz.

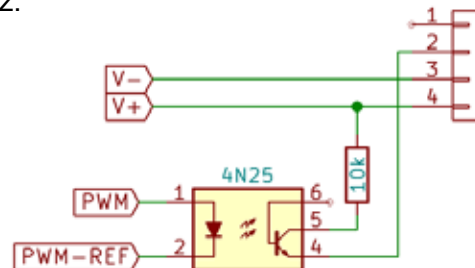


Figure 7

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