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# SERIES: CFM-40BF | DESCRIPTION: DC AXIAL FAN

## FEATURES

- dual ball bearing system
- 40 x 40 mm frame
- multiple speed options
- PWM/tachometer wires available




## MODEL

| | input voltage | | input current[1] | | input power[1] | | rated speed[1] | airflow[2] | static pressure[3] | noise[4] |
|---|---|---|---|---|---|---|---|---|---|---|
| | rated (Vdc) | range (Vdc) | min (A) | max (A) | min (W) | max (W) | typ (RPM±10%) | (CFM) | (inch $H_2O$) | typ (dBA) |
| CFM-4020BF-035-114 | 5 | 4.5~5.5 | 0.04 | 0.06 | 0.20 | 0.30 | 3,500[5] | 4.38 | 0.06 | 11.4 |
| CFM-4020BF-055-212 | 5 | 4.5~5.5 | 0.10 | 0.15 | 0.50 | 0.75 | 5,500[5] | 6.88 | 0.14 | 21.2 |
| CFM-4020BF-075-306 | 5 | 4.5~5.5 | 0.24 | 0.36 | 1.20 | 1.80 | 7,500 | 9.38 | 0.25 | 30.6 |
| CFM-4020BF-095-342 | 5 | 4.5~5.5 | 0.30 | 0.45 | 1.50 | 2.25 | 9,500 | 11.88 | 0.41 | 34.2 |
| CFM-4020BF-135-114 | 12 | 10.8~13.2 | 0.03 | 0.05 | 0.36 | 0.60 | 3,500[5] | 4.38 | 0.06 | 11.4 |
| CFM-4020BF-155-212 | 12 | 10.8~13.2 | 0.06 | 0.09 | 0.72 | 1.08 | 5,500[5] | 6.88 | 0.14 | 21.2 |
| CFM-4020BF-175-306 | 12 | 10.8~13.2 | 0.11 | 0.17 | 1.32 | 2.04 | 7,500 | 9.38 | 0.25 | 30.6 |
| CFM-4020BF-195-342 | 12 | 10.8~13.2 | 0.16 | 0.24 | 1.92 | 2.88 | 9,500 | 11.88 | 0.41 | 34.2 |
| CFM-4020BF-1110-381 | 12 | 10.8~13.2 | 0.21 | 0.32 | 2.52 | 3.84 | 11,000 | 13.76 | 0.55 | 38.1 |
| CFM-4020BF-235-114 | 24 | 21.6~26.4 | 0.02 | 0.04 | 0.48 | 0.96 | 3,500[5] | 4.38 | 0.06 | 11.4 |
| CFM-4020BF-255-212 | 24 | 21.6~26.4 | 0.03 | 0.05 | 0.72 | 1.20 | 5,500[5] | 6.88 | 0.14 | 21.2 |
| CFM-4020BF-275-306 | 24 | 21.6~26.4 | 0.04 | 0.06 | 0.96 | 1.44 | 7,500 | 9.38 | 0.25 | 30.6 |
| CFM-4020BF-295-342 | 24 | 21.6~26.4 | 0.08 | 0.12 | 1.92 | 2.88 | 9,500 | 11.88 | 0.41 | 34.2 |
| CFM-4020BF-2110-381 | 24 | 21.6~26.4 | 0.08 | 0.12 | 1.92 | 2.88 | 11,000 | 13.76 | 0.55 | 38.1 |

Notes:
1. At rated voltage, after 3 minutes.
2. At rated voltage, room temperature, 65% humidity, 0 inch $H_2O$ static pressure.
3. At rated voltage, 0 CFM airflow.
4. Measured in an anechoic chamber as per ISO3745/GB4214-84 at rated voltage, with background noise 20±2 dBA at 1 m from the fan intake.
5. Typical rated speed is measured as RPM±600 at rated voltage.
6. All specifications are measured at 25°C, 65% relative humidity unless otherwise specified.

## PART NUMBER KEY

CFM - 4020BF - 035 - 114 - **XX** - **CXX**

- Base Number
- Fan Signals
  - "blank" = no signals
  - 20 = tachometer signal
  - 22 = tachometer signal / PWM control signal
- Reserved for Custom Configurations

## INPUT

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| operating input voltage[7] | 5 Vdc input models<br>12 Vdc input models<br>24 Vdc input models | 4.5<br>10.8<br>21.6 | 5<br>12<br>24 | 5.5<br>13.2<br>26.4 | Vdc<br>Vdc<br>Vdc |
| starting voltage | 5 Vdc input models<br>12 Vdc input models<br>24 Vdc input models | | 3.5<br>7<br>14 | | Vdc<br>Vdc<br>Vdc |

Note: 7. See Model section on page 1 for specific input voltage ranges.

## PERFORMANCE[8]

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| rated speed | at rated voltage, 25°C, after 3 minutes | 3,500 | | 11,000 | RPM |
| air flow | at 0 inch $H_2O$, see performance curves | 4.38 | | 13.76 | CFM |
| static pressure | at 0 CFM, see performance curves | 0.06 | | 0.55 | inch $H_2O$ |
| noise | at 1 m, rated speed | 11.4 | | 38.1 | dBA |

Note: 8. See Model section on page 1 for specific values.

## PROTECTIONS / FEATURES[9]

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| auto restart | not available on models CFM-4020BF-035-114, CFM-4020BF-055-212, CFM-4020BF-235-114, CFM-4020BF-255-212 | | | | |
| polarity protection | not available on models CFM-4020BF-075-306, CFM-4020BF-095-342, CFM-4020BF-275-306, CFM-4020BF-295-342 | | | | |
| tachometer signal | available on “20” and “22” models | | | | |
| PWM control signal | available on “22” models | | | | |

Notes: 9. See Application Notes for details.

## SAFETY & COMPLIANCE

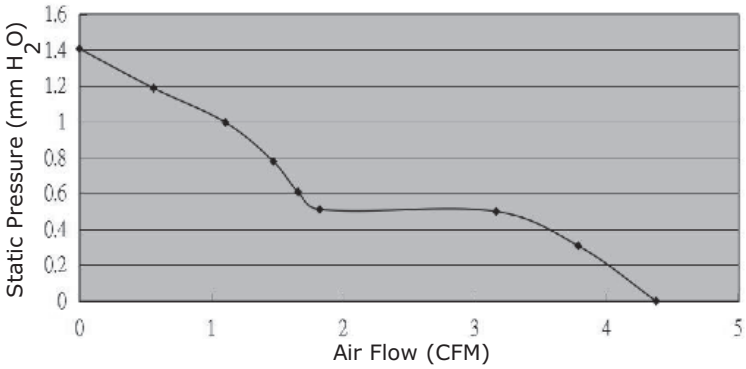
| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| insulation resistance | at 500 Vdc between frame and positive terminal | 10 | | | MΩ |
| dielectric strength | at 500 Vac, 60 Hz, 1 minute between housing and positive terminal | | | 5 | mA |
| safety approvals | UL/cUL 507, TUV (EN/IEC 62368-1:2020+A11) | | | | |
| EMI/EMC | EN 55032:2015, EN 55035:2017 | | | | |
| life expectancy | at 40°C, 65% RH, 90% confidence level | | 70,000 | | hours |
| RoHS | yes | | | | |

## ENVIRONMENTAL

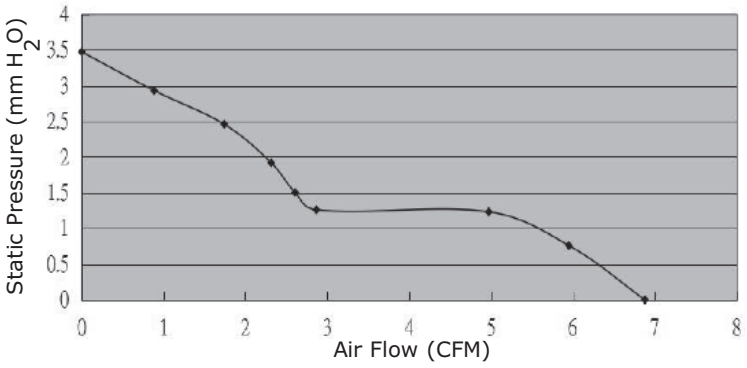
| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| operating temperature | | -10 | | 70 | °C |
| storage temperature | | -40 | | 75 | °C |
| operating humidity | non-condensing | 35 | | 85 | % |
| storage humidity | non-condensing | 35 | | 85 | % |

## PERFORMANCE CURVES

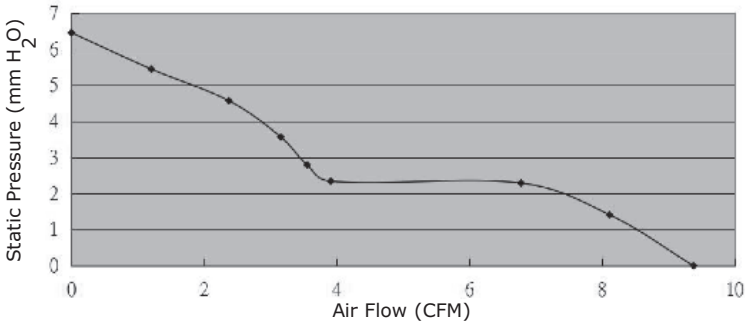
### CFM-4020BF-035-114



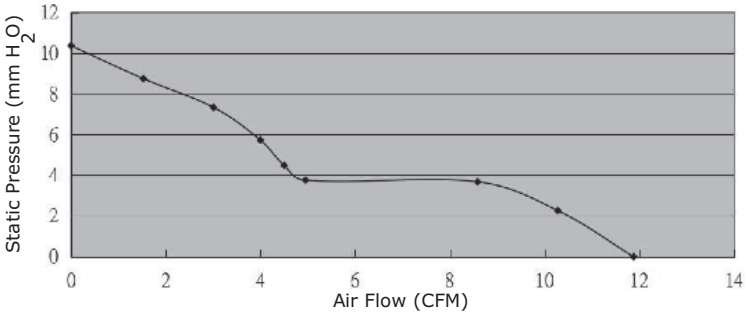

### CFM-4020BF-055-212



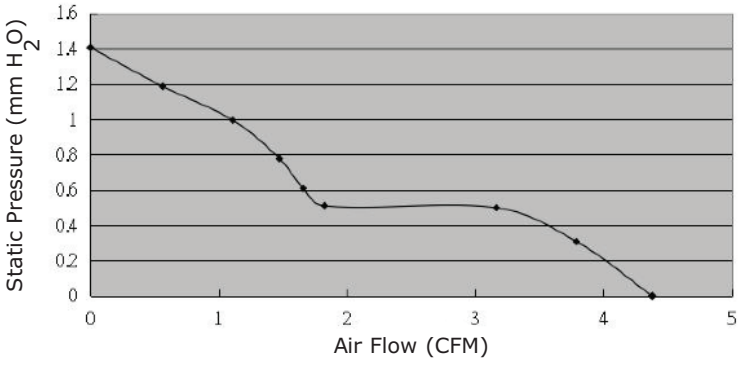

### CFM-4020BF-075-306



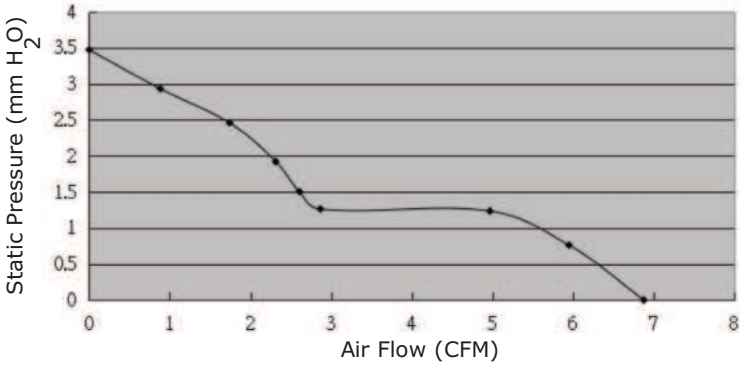

### CFM-4020BF-095-342




### CFM-4020BF-135-114

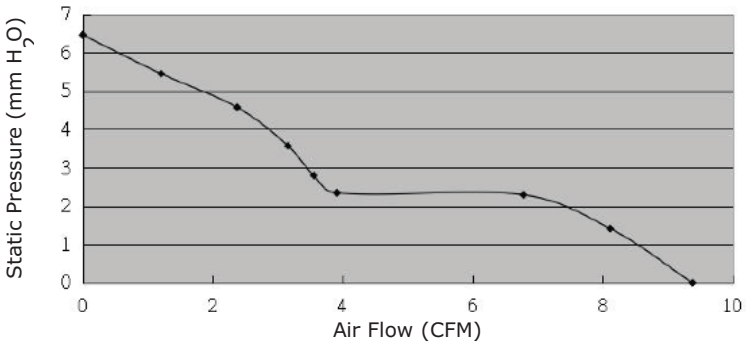



### CFM-4020BF-155-212

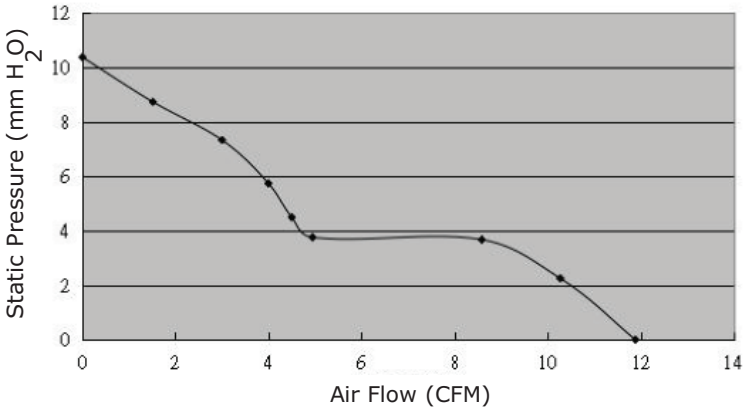


## PERFORMANCE CURVES (CONTINUED)

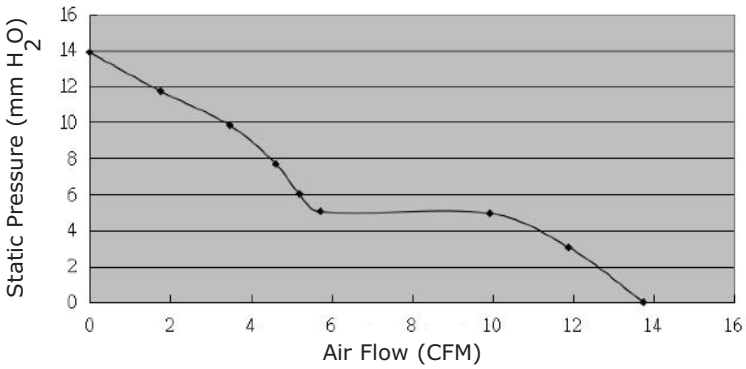
### CFM-4020BF-175-306



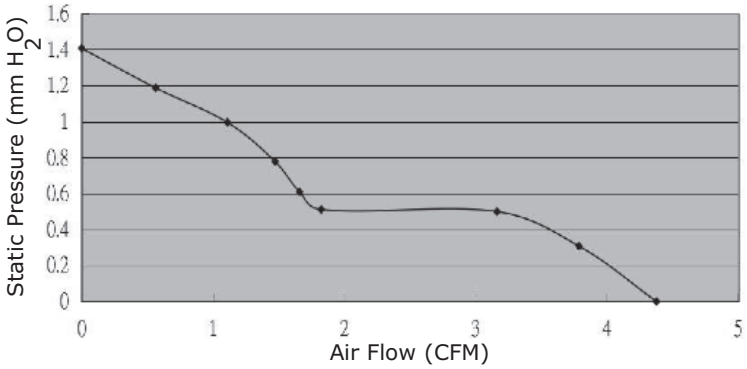

### CFM-4020BF-195-342



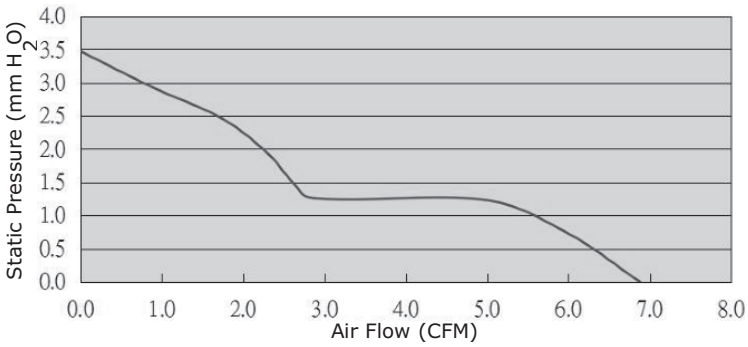

### CFM-4020BF-1110-381



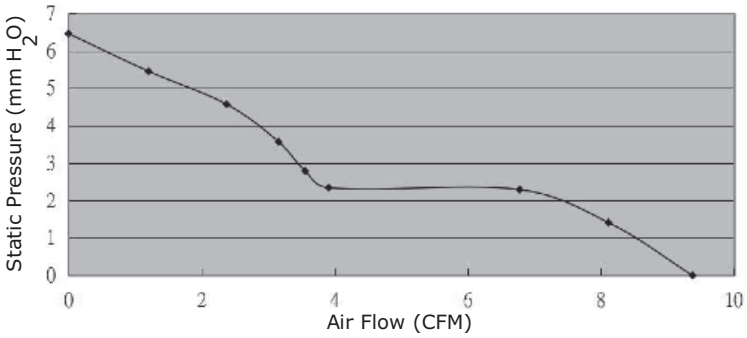

### CFM-4020BF-235-114




### CFM-4020BF-255-212

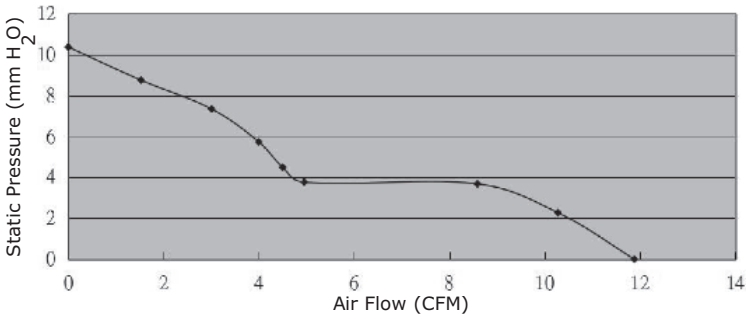



### CFM-4020BF-275-306

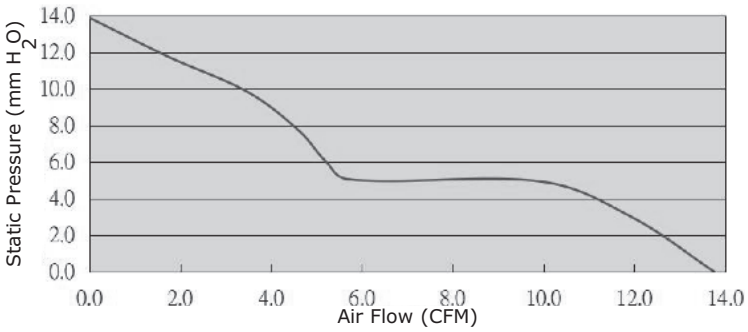


## PERFORMANCE CURVES (CONTINUED)

### CFM-4020BF-295-342




### CFM-4020BF-2110-381



## MECHANICAL

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| motor | 4 pole DC brushless | | | | |
| bearing system | dual ball bearing | | | | |
| direction of rotation | counter-clockwise viewed from front of fan blade | | | | |
| dimensions | 40 x 40 x 20 | | | | mm |
| material | PBT (UL94V-0) | | | | |
| weight | weight varies by model | 21.7 | | 26.0 | g |

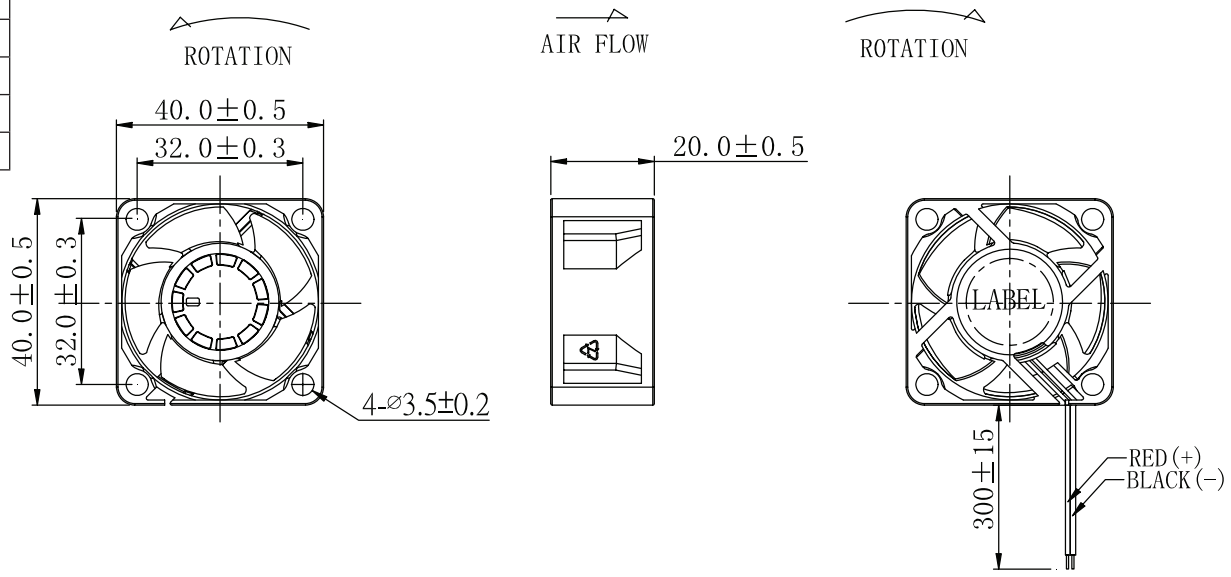
## MECHANICAL DRAWING

units: mm

2 wire versions (+Vin & -Vin): UL 1007, 26 AWG
3 wire versions (+Vin, -Vin, & tach): UL 1007, 26 AWG
4 wire versions (+Vin, -Vin, tach, & PWM): UL 1007, 28 AWG

| MOUNTING SCREW (Pan Head) | | | |
|---|---|---|---|
| Screw Type | Size | Standard | Torque |
| Machine Screw | M3 | JIS B1111-1974 | 7.5 kgf-cm |
| Self-tapping Screw | M4 | JIS B1122 Type 2 | 7.5 kgf-cm |

| WIRE CONNECTIONS | |
|---|---|
| Wire Color | Function |
| Red | +Vin |
| Black | -Vin |
| Yellow[10] | Tach Signal |
| Blue[10] | PWM |




Notes: 10. Wires only present on versions with output signals.

# APPLICATION NOTES

**Auto Restart Protection**

When the fan motor is locked by an external force, the device will temporarily turn off electrical power to the motor and restart automatically when the locked rotor condition is released.

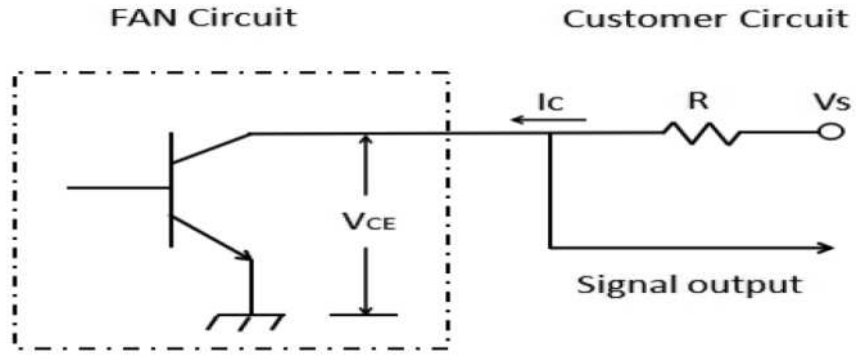
**Polarity Protection**

Able to withstand 10 minutes of reverse polarity connection between the positive and negative wires without causing damage.

**Tachometer Signal (Yellow Wire)**

The tachometer signal is for detecting the rotational speed of the fan motor. The output will be a square wave when fan is operating and $V_{FG}$ or $V_{CE}$ depending on the locked rotor position when fan motor is locked (See Figures 1~2 below).

**Figure 1: Tachometer Output Circuit**




**Output Type: Open Collector**

Vs: ($V_{FG}$)

5 V fan: 3.3~5 V

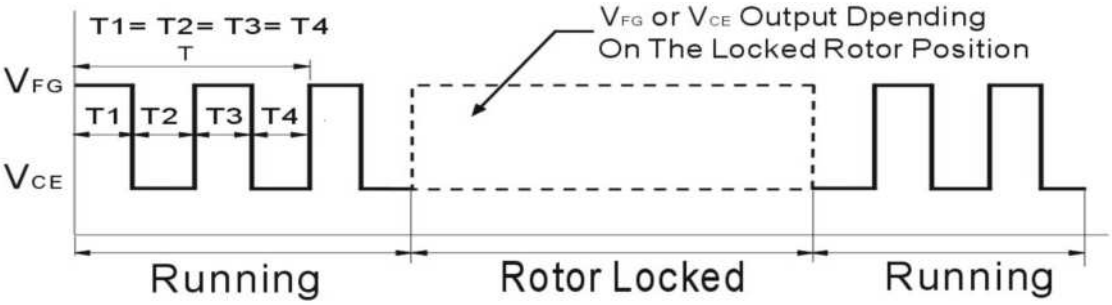
All others: 3.3~15 V

Ic≤5 mA

R≥Vs/Ic

$V_{CE}$(sat)≤0.5 V

**Figure 2: Tachometer Output Waveform**




**4 Pole Motor**

N=RPM

T=60/N (sec)

FG=1/T*2 (Hz)

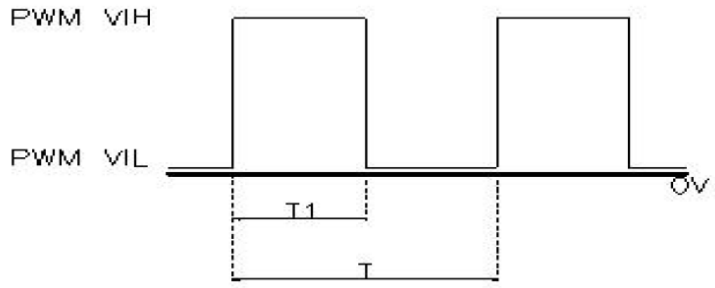
N=FG*30

## APPLICATION NOTES (CONTINUED)

**PWM Signal (Blue Wire)**

This wire is for speed control of the fan motor using a PWM input signal from the customer circuit (See Figure 3 below).

**Figure 3: PWM Input Signal**




PWM Duty Cycle (%) = T1/T x 100%

| Model | PWM Frequency Range (kHz) | PWM VIH (V) | PWM VIL (V) |
|---|---|---|---|
| CFM-4020BF-035-114-22 | 5~50 | 2.7~5.5 | 0~0.7 |
| CFM-4020BF-055-212-22 | 5~50 | 2.7~5.5 | 0~0.7 |
| CFM-4020BF-075-306-22 | 5~50 | 2.7~5.5 | 0~0.7 |
| CFM-4020BF-095-342-22 | 0.2~50 | 2.5~10 | 0~0.8 |
| CFM-4020BF-135-114-22 | 8.0~55 | 2.3~10 | 0~0.7 |
| CFM-4020BF-155-212-22 | 8.0~55 | 2.3~10 | 0~0.7 |
| CFM-4020BF-175-306-22 | 0.3~45 | 2.0~6.0 | 0~0.6 |
| CFM-4020BF-195-342-22 | 0.3~45 | 2.0~6.0 | 0~0.6 |
| CFM-4020BF-1110-381-22 | 0.3~45 | 2.0~6.0 | 0~0.6 |
| CFM-4020BF-235-114-22 | 0.6~55 | 2.3~10 | 0~0.7 |
| CFM-4020BF-255-212-22 | 0.6~55 | 2.3~10 | 0~0.7 |
| CFM-4020BF-275-306-22 | 0.6~55 | 2.3~10 | 0~0.7 |
| CFM-4020BF-295-342-22 | 0.6~55 | 2.3~10 | 0~0.7 |
| CFM-4020BF-2110-381-22 | 0.6~55 | 2.3~10 | 0~0.7 |

## REVISION HISTORY

| rev. | description | date |
|---|---|---|
| 1.0 | initial release | 10/14/2021 |
| 1.01 | added PWM signal versions | 05/19/2022 |
| 1.02 | logo, datasheet style update | 08/12/2022 |
| 1.03 | added new models | 01/29/2024 |
| 1.04 | CUI Devices rebranded to Same Sky | 09/12/2024 |

The revision history provided is for informational purposes only and is believed to be accurate.

Same Sky offers a one (1) year limited warranty. Complete warranty information is listed on our website.

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