

REVISIONS	
REV	DESCRIPTION
E	UPDATE PER EC088044

# Turbine Box Hardware Specification PB 540

<b>COVIDIEN</b> 6135 Gunbarrel Avenue Boulder, CO 80301 Proprietary and Confidential	TITLE: Turbine Box Hardware Specification, PB 540	DOCUMENT NUMBER <b>10025027</b> SHEET 1 of 7	REV <b>E</b>
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## 1.0 INTRODUCTION

### 1.1 Purpose

This document provides the specification for the turbine box for the PB640, PB560, PB540 and PB520.

### 1.2 Scope

This specification describes the functional requirements for the turbine box for the PB640, PB560, PB540 and PB520.

### 1.3 REVISION HISTORY

Revision	Date	Author	Change Description
A	02 Jun 08		Initial Release of Specification.
B	03-Jun-2008		Clarified performance requirements, made minor formatting changes, and corrected spelling.
C	See Agile	See Agile	UPDATE PER ECO-R172706
D	See Agile	See Agile	Add one more hole on the turbine housing to mount the new collar (adhesive less)
E	See Agile		Update wire colour table in section 3.18. Correct test RPM reference from 78000 rpm to 72000 rpm Clarify Label detail in Section 3.14.

## 2.0 THEORY OF OPERATION

This blower box shall consist of an airflow generator able to deliver a range of flow and pressure sufficient to provide ventilation performance of the PB 640, PB560, PB540 and PB520 devices. The stream generator is a micro low inertia turbine driven by a brushless DC electric motor. The blower box materials including plastic and metal parts shall be designed to reduce sound level. The blower shall include a Thermistor NTC 10K  $\Omega$  sensor type mounted on the motor to allow temp monitoring. Hall Effect sensors shall be available to monitor the blower speed.

## 3.0 DESIGN REQUIREMENTS

### 3.1 Motor

HWTUB1 The motor shall be a brushless DC motor with built-in Open Drain Hall Effect sensor.

HWTUB2 The motor shall operate up to a 24 VDC  $\pm 10\%$  supply voltage on each phase.

HWTUB3 The motor shall be able to run with 3A max current.

HWTUB32 The motor sensors shall operate with a 6.2 VDC  $\pm 10\%$  supply voltage.

### 3.2 Performance

HWTUB4 The blower shall deliver 100 lpm  $\pm 1\%$  into a pressure of 22 hPa  $\pm 1\%$  when a current source of 0.90A (+0.2A; -0.15A) is applied.

HWTUB5 The pressure shall be greater than 70mbar with the output of the blower blocked.

HWTUB6 The current shall be 1.15 A +0.5A / - 0.2A with the output of the blower blocked.

HWTUB7 The blower shall deliver a minimum of 250 lpm into a pressure of 24 hPa  $\pm 1\%$  when a current source of 2.4A  $\pm 0.4$  A is applied

The blower shall be able to run at 72000 rpm  $\pm 1500$  for one (1) second. This ensures proper adhesion between the motor and impeller.

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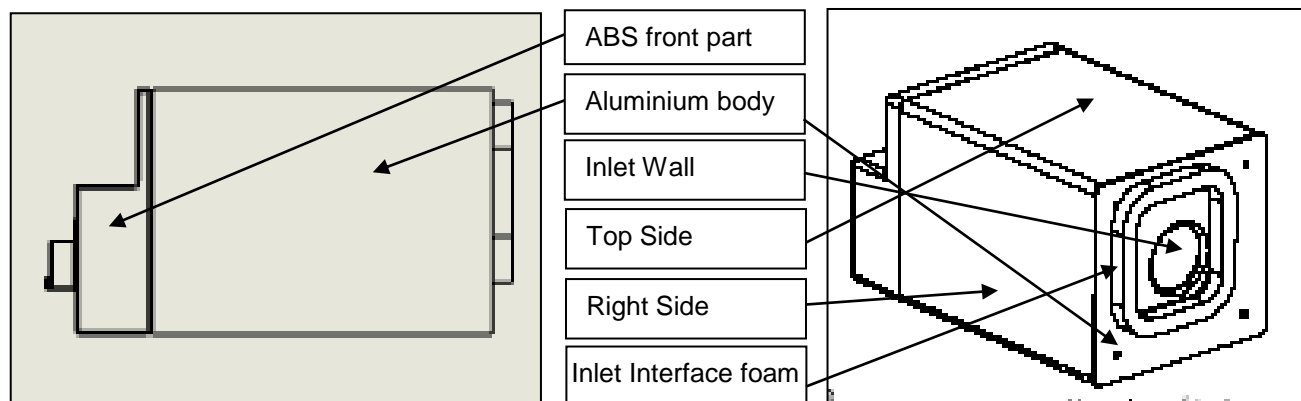
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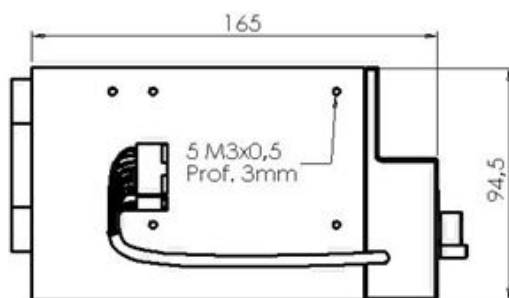
### 3.3 Material

HWTUB8 The main shall be made in aluminum and inlet plate shall be made from stainless steel.  
HWTUB9 The front part of the enclosure shall be blue molded ABS.



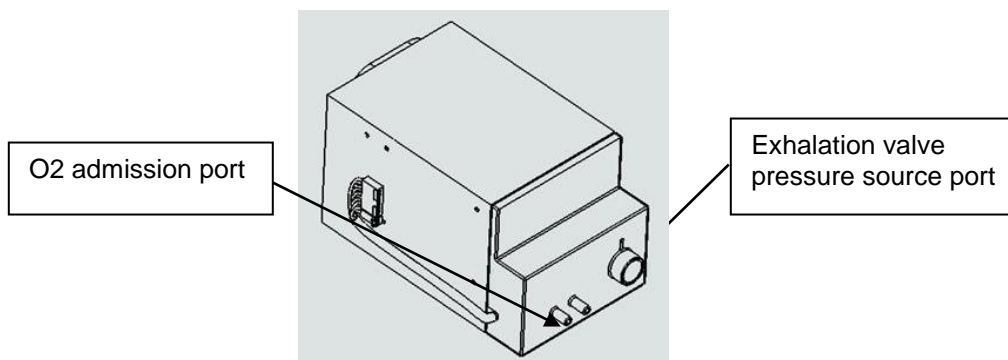
### 3.4 Turbine board mounting

HWTUB10 The turbine enclosure shall include 4 - M3x0.5 6H tapped holes on the left side of 3 mm depth for the turbine board to be mounted and a 5<sup>th</sup> M3x0.5 6H tapped hole for the p-clip collar mounting.



### 3.5 Gas Sources

HWTUB11 The turbine enclosure shall contain an air inlet.  
HWTUB12 The turbine enclosure shall contain an oxygen inlet port and an exhalation valve pressure source port at the outlet of the enclosure.



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### 3.6 Environmental operational conditions

HWTUB13 The blower shall meet its performance requirements when the ventilator is operated at temperatures from 5°C to 40°C, humidity from 10 to 95% RH and barometric pressure from 600 to 1100hPa.

### 3.7 Environmental storage conditions

HWTUB14 The blower shall allow storage conditions from -40°C to + 70°C, from 5 to 95% RH and from 600hPa to 1100hPa barometric pressure.

### 3.8 Positioning requirements

HWTUB15 The blower shall meet its performance requirements when used in any orientation.

### 3.9 Dimensions

HWTUB16 The blower box shall have the following external dimensions (excluding the ports):

Length: 165mm  $\pm$  0.5mm

Width: 99.5mm  $\pm$  0.5mm

Height: 94.5mm  $\pm$  0.5mm.

### 3.10 Air inlet interface

HWTUB17 The inlet interface shall consist of sealed foam glued on the box to ensure the airtightness between the blower box and the housing.

### 3.11 Air outlet interfaces

HWTUB18 The blower box shall provide a main outlet with 18mm  $\pm$  0.2mm outside diameter and a draft of 1deg to deliver the flow.

HWTUB19 The blower box shall provide an Oxygen inlet port and an outlet exhalation valve pressure source port with 5mm  $\pm$  0.2mm outside diameter and a draft of 1deg.

### 3.12 Weight

HWTUB20 The blower assembly shall weigh 1.2kg  $\pm$  0.1kg.

### 3.13 Lead free

HWTUB21 The blower shall be compliant with EN 2002/95/CE guidelines.

### 3.14 Labeling / Traceability

HWTUB23 The blower box shall be labeled with the manufacturer name, manufacturer part number, agile part number and revision, and lot number and/or serial number (with date code).

### 3.15 Temperature sensor

HWTUB24 The blower motor shall integrate a thermistor NTC 10 K $\Omega$   $\pm$ 1% (at 25°C).

### 3.16 Temperature sensor connector

The Temperature sensor connector shall be wired as follows:

Pin Number	Signal Name	Wire Color
1	Temp -	Red or White
2	Temp +	Red or White

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### 3.17 Motor control wires

HWTUB25 The electrical interface of the blower shall consists of 8 wires of 165mm +5mm/-10mm length / AWG 24 including the connector (Molex 22-01-2085, 8 contacts 08-50-0032). This includes the interfaces for motor control and Hall Effect sensor.

### 3.18 Motor control connector

The motor control connector shall be wired as follows:

Pin Number	Signal Name	Wire Color
1	Phase 1	Brown
2	Phase 2	Red
3	Phase 3	Orange
4	Sensor Supply	Yellow
5	GND	Green
6	PH1 Sensor	Blue
7	PH2 Sensor	Black
8	PH3 Sensor	Grey

Timing relationships between the motor phases and the hall sensors:

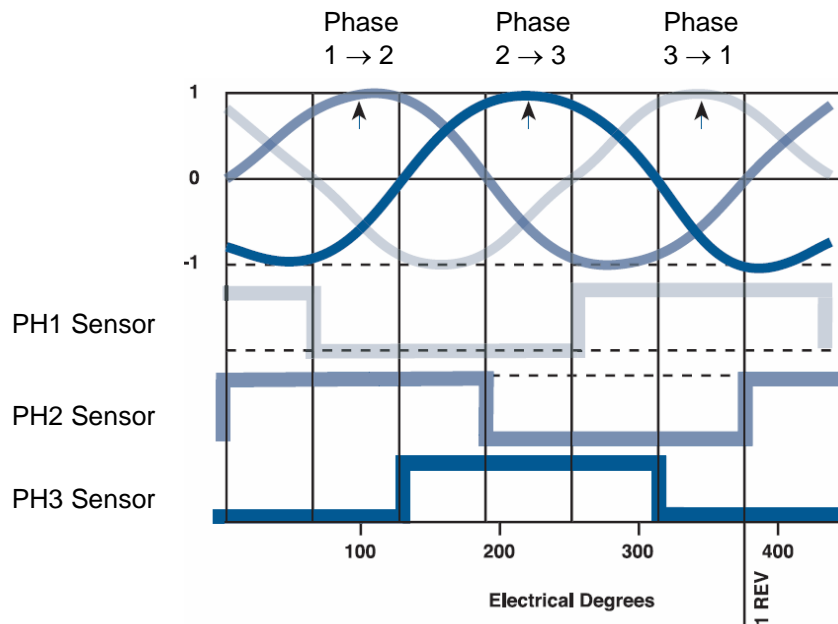


Fig 1: Timing Relationships

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Hall Effect position:

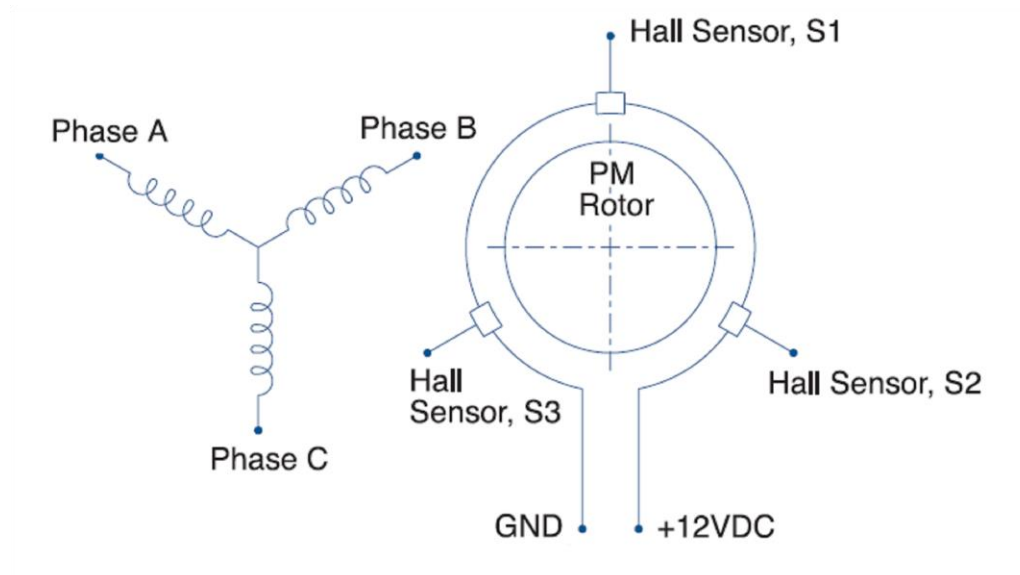


Fig 2: Hall Effect position

### 3.19 Temperature sensor wires

HWTUB26 The temperature sensor wires shall be 165mm +5mm/-10mm length / AWG 30 including connector (Molex 22-01-2025, 2 contacts 08-50-0032)

### 3.20 Electrical insulation

HWTUB27 The wires shall be protected by additional electrical insulation (heat shrink) with a Length of 90mm  $\pm$  5mm.

### 3.21 Wiring Position

HWTUB31 The blower box shall be designed with the electrical wires coming from the left side of the box.

### 3.22 Packaging

HWTUB28 The blower box shall be shipped in an individual sealed bag.

HWTUB29 Packaging shall be tested to the international standard ISTA2A.

HWTUB30 Packaging shall be designed to minimize the level of waste and waste disposal as per the European Directive on handling waste packaging.

**Certificate Of Compliance is required.**

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