

# FH400



## Application

- Pharmaceutical Isolators
- Vivariums
- Clean Tech & Laboratory
  - Clean Rooms
  - Critical Containment
  - Biological Safety Cabinets
  - Chemical Fume Hoods
  - Laminar Flow Hoods
  - Clean Benches
  - HEPA & Filter Boxes
  - Incubation & Micro Environments
- Indoor Data Logging
- Data Center
  - Server Exhaust/Intake Analysis
- High Performance Electronics
  - Energy Balance Testing
  - Data Racks
  - Telecom Shelters
  - Data Logging
- HVAC
  - Heat Exchangers
  - Airflow Ventilation

## Degree Controls, Inc.

is an ISO-9001 certified, world-class designer and manufacturer of airflow sensing, monitoring, and control solutions. With over 25 years of proven experience, we pride ourselves on delivering solutions which provide the value, differentiation, and service required by our customers, to meet the rapidly changing competitive landscape that they face.

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## Overview

The FH400 is a versatile and rugged, high-performance air velocity, temperature, and humidity sensor with both analog and digital communication outputs. Designed with conformal coated electronics and a sealed enclosure, the FH400 is suitable for demanding applications. With its robust, splash proof design and UV tolerant construction, the FH400 is designed to handle a wide range of critical product and process control applications:

### • Pharmacy Manufacturing Processes

Determining the exact humidity within chemicals and products is vital during the manufacturing process. Humidity content generally needs to be as low as possible to prevent the formation of any micro-organisms, and conversely, a certain level of humidity is required throughout the processes. Achieving and maintaining a humidity equilibrium with the surrounding air is key to allowing substances to absorb, retain, or release water where necessary.

### • Vivariums

Maintaining a stable and controlled environment for species and personnel is essential to good quality research. Many species of animals and plants have very limited tolerances to certain humidity and temperature levels that need to be actively monitored and varied throughout the day.

### • Data Logging

Taking measurements at various points to better understand air flow, temperature, and humidity levels in environments such as green houses or HVAC ducts helps to further improve processes.

The FH400 series is configured to order, with a variety of velocity ranges, mechanical lengths, and output communication styles. The voltage output may be configured 0-5V or 0-10V, and can be augmented with simultaneous digital communication, either UART or I<sup>2</sup>C.

## Mechanical Features

- Innovative “outside the duct” installation: Single hole for mounting sensor assembly, without need for hands inside the duct.
- Optimized flow geometry with segregation of velocity, temperature, and humidity elements for highest accuracy.
- Aerodynamic cross section to minimize flow disturbance.
- Robust, sealed probe assembly uses corrosion and UV resistant materials.
- Printed insertion depth markers and flow direction arrow.
- Conformal coated velocity and temperature sensing elements for environmental protection.
- 2m [6 ft] plenum-rated cabling suitable for HVAC, laboratory, and process control applications.
- RoHS compliant
- CE certified

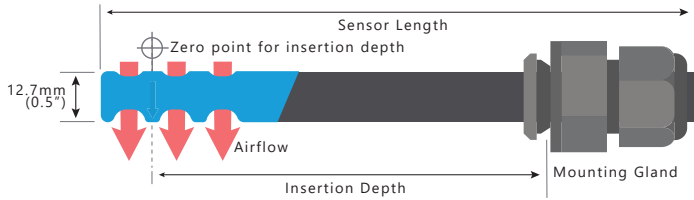
## Electrical & Performance Features

- Industry-leading air velocity performance, with repeatability within 1%.
- 1°C air temperature accuracy.
- Best in class acceptance angle performance.
- 24 VDC nominal voltage input.
- Configurable voltage output for velocity, temperature, AND humidity.
- Simultaneous digital communication is available.
- May be configured as an airflow switch with open drain output.
- Multi-sensor addressing capability.
- Configurable velocity averaging for smoothing sensor response.
- <10 second start-up time and 400ms response time.

# Specifications

|                                    |  |
|------------------------------------|--|
| Velocity Range                     | 0.15m/s to 20m/s (30 fpm to 4,000 fpm) |
| Operating Temperature              | 0°C to 60°C (32°F to 140°F)            |
| Storage Temperature                | -40°C to 105°C (-40°F to 221°F)        |
| Response Time                      | 400ms                                  |
| Relative Humidity (non-condensing) | 5-95%                                  |
| Supply Power Requirements          | 19 - 29 VDC, 20mA nominal              |

|                                      |   |
|--------------------------------------|---|
| Velocity/Temperature/Humidity Output | 0-5V or 0-10V output  |
| Digital Output                       | UART or I <sup>2</sup> C available for flow and temperature information |
| Alarm Output                         | Open drain, configurable trip point for velocity and temperature        |
| Housing Construction                 | Polycarbonate (PC), UL94-V0 (head)<br>UL94-HB (housing)                 |
| Plenum Rated Cable                   | 22 AWG  |
| Environmental Protection             | IP65 electronics, including conformal coated sensing element            |



Gland Nut (left) or °C Clamp (right) fitment options available

## Mechanical Sizes & Installation

Three sensor lengths available, to accommodate insertion depths of 44.45mm [1.75"] to 257mm [10.1"]. See graphic above for insertion "zero point" datum.

## Air Velocity Performance

**Repeatability ±1% of reading (under identical conditions)**

### Air Velocity Range

- 0.15 to 1.0 m/s (30 to 200 fpm)
- 0.5 to 10 m/s (100 to 2,000 fpm)
- 1.0 to 20 m/s (200 to 4,000 fpm)
- \*within compensation range

### Air Velocity Accuracy\*

- ± (1% of reading + 0.05 m/s [10 fpm])
- ± (4% of reading + 0.10 m/s [20 fpm])
- ± (5% of reading + 0.15 m/s [30 fpm])

**Resolution:** 0.1°C

## RH Accuracy

±2%RH from 0–100%

## Temperature Compensation Range

**Temperature Compensation Range:** The FH400 is a thermal airflow sensor; it is sensitive to changes in air density and indicates velocity with reference to a set of standard conditions (21°C (70°F), 760mmHg (101.325kPa), and 0%RH). The FH400 has been designed so that when used over the stated temperature compensation range, the sensor indicates very close to actual air velocity and minimal compensation is only required to account for changes in barometric pressure or altitude.

## Part Number Format

FH400 - L - V - O - F

### L = Sensor Length

- 1 = 165mm [6.5"] max insertion depth = 123 mm [4.8"]
- 2 = 224mm [8.8"] max insertion depth = 180 mm [7.1"]
- 3 = 300mm [11.8"] max insertion depth = 257 mm [10.1"]

### V = Velocity Profile

- A = 0.15 to 1.0 m/s [30 to 200 fpm]
- B = 0.5 to 10.0 m/s [100 to 2,000 fpm]
- C = 1.0 to 20.0 m/s [200 to 4,000 fpm]

### O = Output Configuration

- 1 = 0 – 5 VDC analog temperature, velocity, and humidity
- 2 = 0 – 10 VDC analog temperature, velocity, and humidity
- 3 = UART communication output only
- 4 = 0 – 5 VDC analog and UART comm.
- 5 = 0 – 10 VDC analog and UART comm.
  - I<sup>2</sup>C is available – call DegreeC

### F = Fitting

- 1 = Gland Nut
- 2 = °C Clamp



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