Specifications for Sentinel FLOWTIM System

Ultrasonic Measurement of Gas Turbine Intake Air Mass Flow Rate

Operations and Performance

Duct Sizes

- 3 - 30 ft sound pulse flight path

Principle of Measurement

- Air mass flow rate = air mass flow rate per unit area x duct area x duct factor
- Air mass flow rate per unit area = air speed x air density
- Air speed: calculated from sound pulse flight times
- Air density: calculated from sound pulse flight times and physical sensor readings
- Duct area: calculated from duct survey
- Duct factor: calculated from CFD analysis

Ranges

- Air speed: 0 to 150 ft/s
- Pressure: 12 to 16 psia
- Relative humidity: 0 to 100% non-condensing
- Temperature: -22 to +176 °F

Update Interval

- Less than 0.5 second for typical gas turbine duct sizes

Accuracy of Air Mass Flow Rate Measurement

- Custom calculation based upon duct geometry and air speed
- Typically less than 0.5% total uncertainty for air speed
- Typically less than 1.0% total uncertainty for air mass flow rate

Data Communications

FLOWTIM Data Server accessible over LAN/WLAN from supplied Data Client. One data client connection is allowed per system. All signals can be interrogated from Data Client:

- Air density
- Air mass flow rate per unit area
- Air mass flow rate
- Air speed
- Flight times
- Noise levels
- Sonic velocity

Ultrasonic Probes

Material:
- Probe Housing: Aluminum
- Transducers: Aluminum

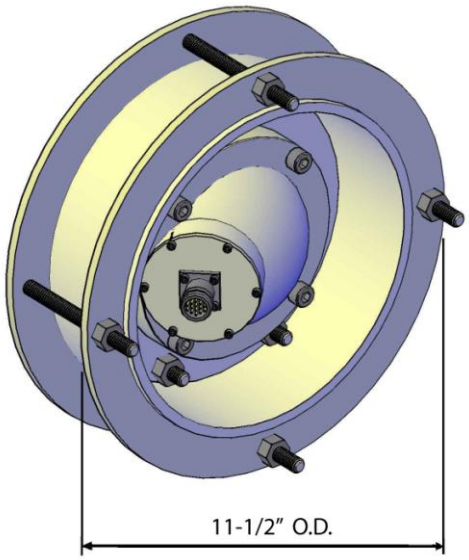
Weight: 4.90 lbs

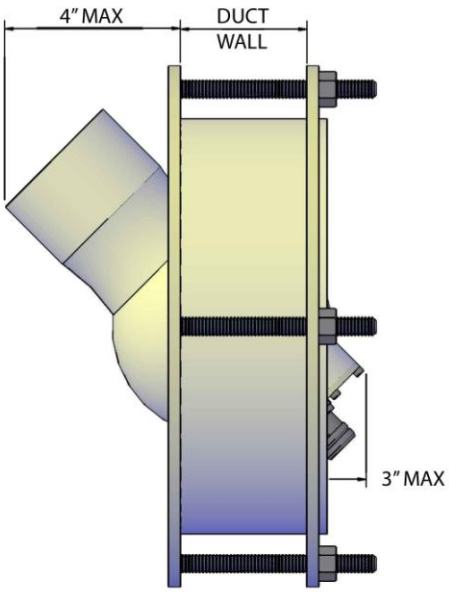
Size: ⌀3" x 7 ¾" long

Max Protrusion (Interior of Inlet Duct):
4" Maximum

Max Protrusion (Exterior of Inlet Duct):
3" Maximum

Environmental Specification
- NEMA4 (IP65)
- -35°C to 60°C (-31°F to 140°F)
- Max Inlet Duct Pressure 20" H_2O





Optional Physical Sensors

- Static Pressure (800 – 1100 mbar, ± 1 mbar)
- Temperature (-30 to +70 °C, ± 0.5 °C)
- Relative Humidity (0 to 100%, ± 2%)

Control Box

Dimensions

Main Enclosure
Weight 82 lb
Size (H x W x D): 36" x 30" x 10"

Enclosure

- 14 ga. Steel, solid single door, flush-mount.
- Finish: ANSI 61 gray.
- UL 508A Listed; Type 4, 12; File No. E61997
- NEMA/EEMAC Type 4, 12, 13
- CSA, File No. 42186: Type 4, 12
- VDE IP66
- IEC 60529, IP66

Power Supplies

- 110 – 120 VAC, 60 Hz Standard
- 220 – 240 VAC, 50 Hz Optional

Power Consumption

< 2 amps

Operating Temperature

-30°C to 50°C (-22°F to 122°F)

Storage Temperature

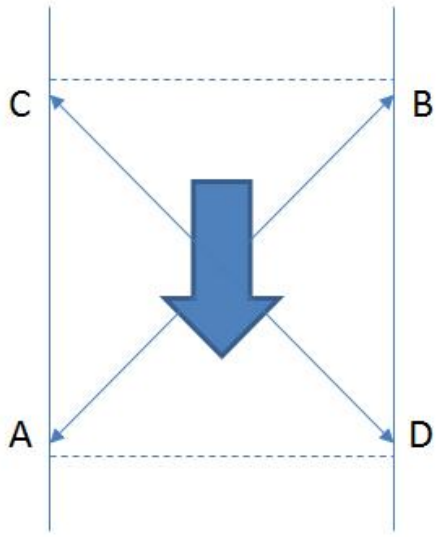
-55°C to 75°C (-67°F to 167°F)

Transducer Cables

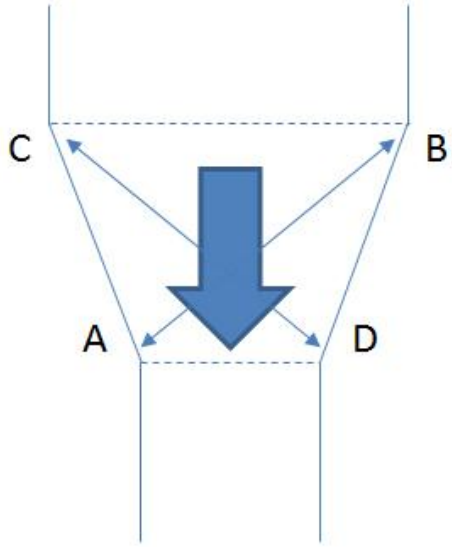
4 pair, Individual & overall shielded
(Custom configured for application)

Best Probe Locations
For Different Duct Geometries

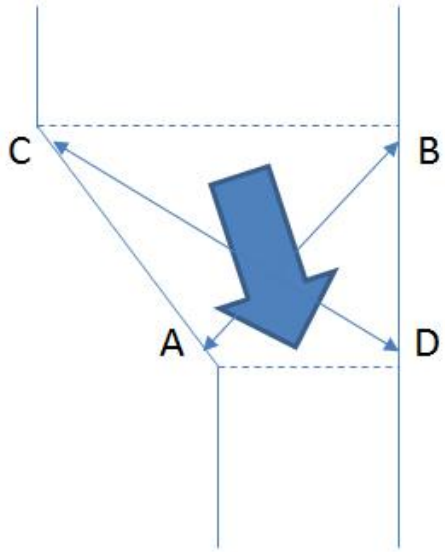
Rectangular



Symmetric Trapezium



Asymmetric Trapezium



Final locations for probes is always subject to local constraints (support girders, seams, wall thickness), therefore pre-installation photographic survey of duct interior and exterior is always required.
Best accuracy and sensitivity is achieved when AB is perpendicular to CD.