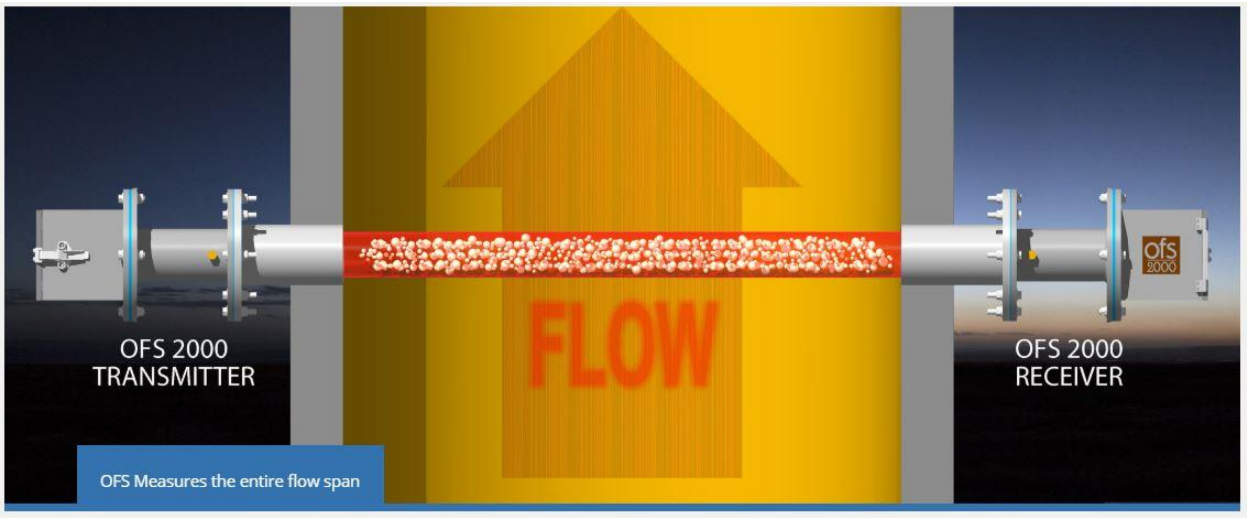
Optical Scientific, Inc.

OFS-2000 OPTICAL FLOW SENSORS EXPLAINED

In 1981, Dr. Ting-I Wang, working at the NOAA ERL Wave Propagation Laboratory published a seminal paper: *Wind Measurements By Temporal Cross-Correlation Of Optical Scintillation* showing how this method could be used to measure changes in air flow by analyzing the movement of air through a beam of light.

In 1985, with a small group of other talented scientists, engineers, and technicians, Dr. Wang founded Optical Scientific, Inc. to develop this discovery. For several years the company engaged in design and development of a successful product line of increasingly sophisticated instruments to measure rain, snow, precipitation, and visibility. During this period OSI continued constant exploration and refinement of the software algorithms and manufacturing techniques, building its reputation for quality and accuracy. All this culminated in the introduction of the OFS 2000 Optical Flow Sensor in 1999.

All the preceding discoveries and enhancements were adapted into this new sensor. This ground-breaking instrument was introduced to the world market where it soon proved to be the sensor of choice for industrial customers concerned with Continuous Emissions Monitoring Systems (CEMS) to help reduce greenhouse gas emissions. As time went on, further applications were found in power, petrochemical, and mining industries. Today, OFS 2000 systems are installed around the globe – every place where accurate flow monitoring is a critical factor.



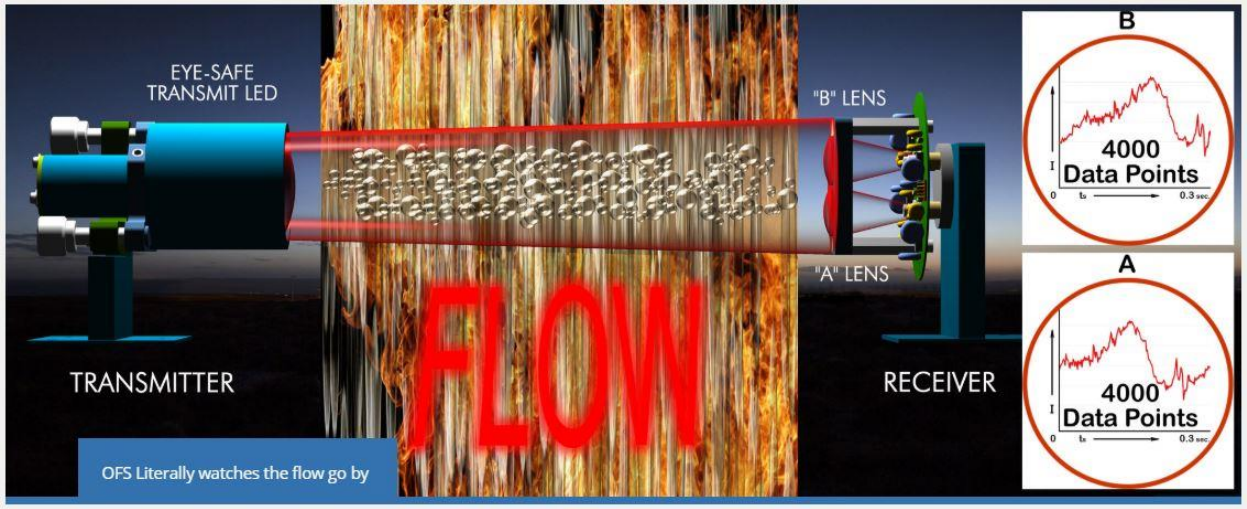
301-963-3630 phone • 301-948-4674 fax • 2 Metropolitan Ct., Suite 6, Gaithersburg, MD 20878-4008 USA • www.opticalscientific.com

HOW IT WORKS:

OFS 2000 measures optical scintillation across the *entire distance* between the transmitter and receiver. It is the only flow sensor that gives a true non-contacting *complete* cross-stack flow measurement.

OPTICAL DETECTION

OSI's patented optical scintillation measurement algorithm uses advanced Digital Signal Processing (DSP) to measure the movement of turbulence found in a gaseous flow stream, providing highly accurate, measurements. OFS takes 4000 data points every 0.3 seconds and measures instantaneous average velocity.



OFS Literally watches the flow go by

NO CALIBRATION REQUIRED

By its very nature OFS scintillation measurement does not drift. This means OFS 2000 systems require no calibration – ever. OFS technology uses a proprietary patented algorithm developed by OSI and certified by NIST (National Institute of Standards and Technology) and is supported with over 20 million hours of observation data. Automatic calibration check and continuous self-test diagnostics are built-in for user security. Drift >3% from norm will cause a fault alarm. Since 1999 there have been no instances of calibration fault in any OFS system.

OFS 2000 SCINTILLOMETRIC MEASUREMENT UNIQUE ADVANTAGES:

NON-INTRUSIVE

With no direct contact with flow, measurement does not cause any pressure drop, or affect the flow characteristics in any way. If OFS 2000 can detect the turbulence-induced light fluctuations with even a fraction of the light, it can accurately measure the flow velocity. It is in this sense, a “pure” measurement.

NO MOVING PARTS

OFS 2000 is essentially maintenance-free, save for window cleaning. OFS internal monitoring alerts the user if window cleaning is required. (Typically only semi-annually (if then) on the dirtiest stack and duct applications.)

IMMUNE TO STANDARD ERROR MECHANISMS

Measurement Not Affected By:

- Distance
- Pressure
- Temperature
- Gas Density
- Moisture
- Opacity

Measurement Not Dependent On:

- Differential pressure
- Design DP
- Beta ratio
- Temperature
- Gas composition
- Humidity
- Speed of sound

BROAD ACCEPTANCE & SUPERIOR ACCURACY

Housed in a rugged package to cope with hazardous or explosive environments, OFS 2000 is capable of measuring flow velocity from 0.03 to 170 m/sec across distances from 0.2 to 12 meters with 5000/1 turndown ratio.

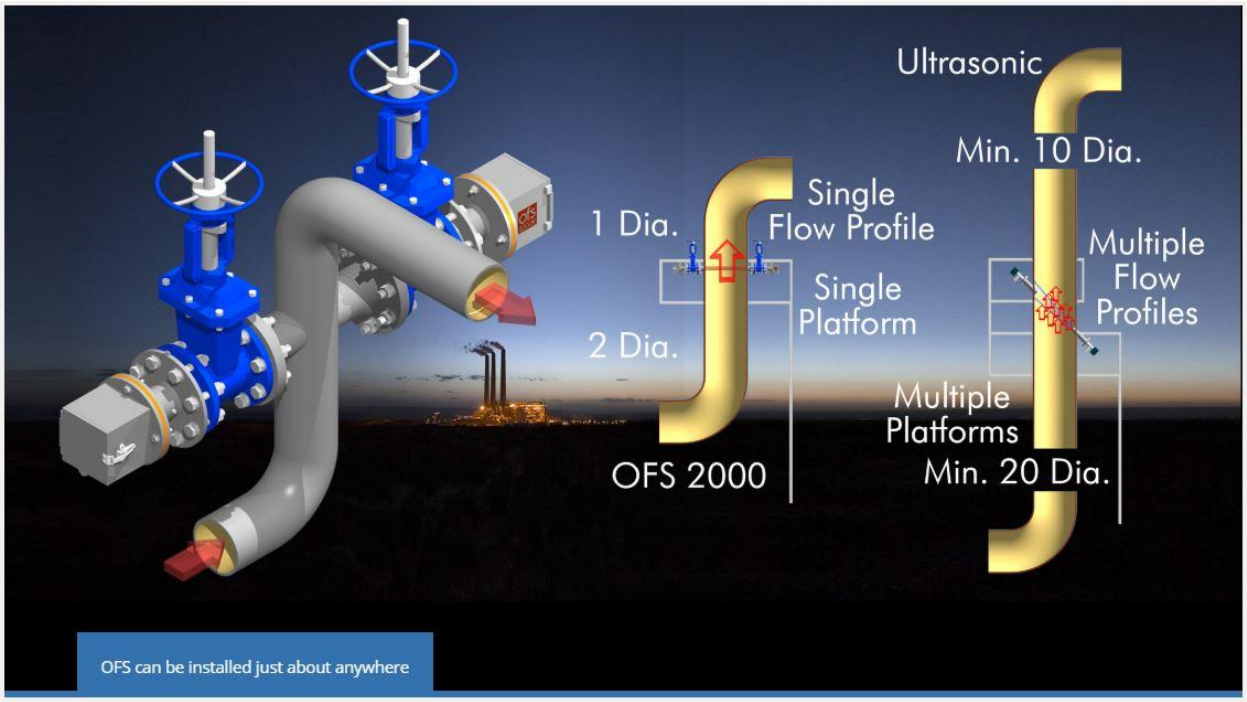
OFS 2000 SYSTEM FEATURES:

MEASURES VOLUMETRIC FLOW

OFS is primarily a velocity sensor. However, all OFS models are equipped with two 4-20 mA inputs to accept readings from add-on smart temperature and pressure sensors, enabling OFS to report standard volumetric flow. Older models can be easily retrofitted in the field or at our facility.

FLEXIBLE INSTALLATION

Designed to meet the broad range of industrial applications, OFS can install in tight spaces with minimum space requirements of 2 upstream / 1 downstream diameters. Installation is based on standard ANSI pattern 4" pipe flange. OFS can be installed on live process pipes using hot tap procedure and gate valves for isolation. No re-piping and no shutdown needed.



OFS can be installed just about anywhere

FLEXIBLE COMMUNICATION

All systems are equipped with 4-20mA Current Loop, RS-232/485, ModBus RTU data outputs, and can be configured with Serial port, Limited Distance Modem, and Fiber Optic Interface for any type of WAN or LAN.

ASSURES COMPLIANCE

All OFS 2000 sensors meet or exceed requirements set by the Environmental Protection Agency, and California's South Coast Air Quality Management District.

- EPA Method 14
- EPA MACT RSR 40 CFR 63.670
- EPA 40 CFR part 60 & 75
- EPA 40 CFR part 60 sub part J & Ja
- SCAQMD rule 1118

OFS-2000 Certifications: UL 3101-1:1993, CSA C22.2 No. 1010.1:92, IEC 61010:1999

From the beginning, OSI has followed a policy of constant research, innovation, and improvement. Since OFS 2000 was introduced, OSI has responded to market needs with models to support a variety of industrial applications. We take pride in supporting our customers' quest for improved performance.

CONTACT INFORMATION

Optical Scientific, Inc.
2 Metropolitan Court, Suite 6
Gaithersburg, MD 20878 USA
Tel: +01 301 963 3630 Fax: +01 301 948 4674

Email: info@opticalscientific.com
Web: www.pticalscientific.com