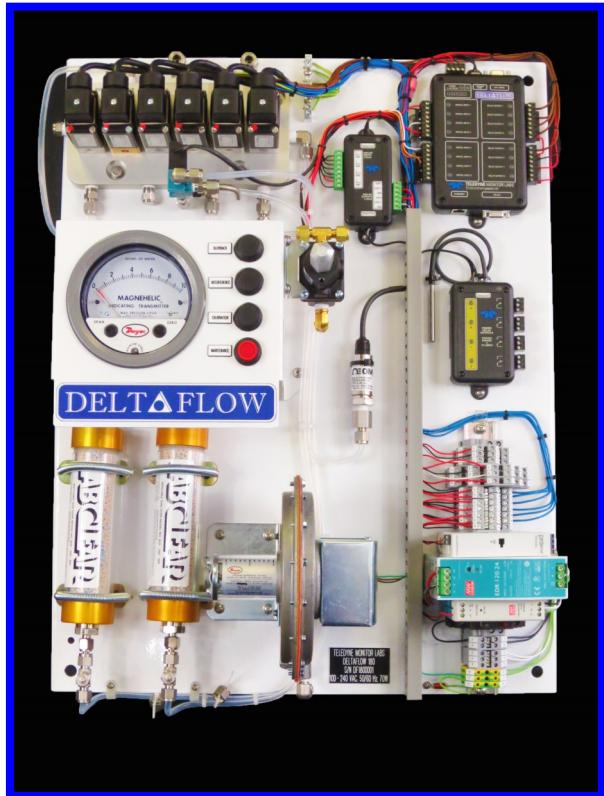




# DELTA $\Delta$ FLOW

## MODEL DF180



The DELTAFLOW, Model DF180, is a state of the art differential pressure measurement system used to calculate gas velocity and pollutant mass emissions in square, rectangular or circular air ducts and stacks using either single or multi point measurements. It especially excels in gas streams with challenging properties such as high temperature, moisture content, pressure, particulate loading and corrosive.

Starting with the hardware, the enclosure assembly contains the active components and electronics necessary to accurately monitor differential pressure, perform calibrations, and blowback probe purge. The pitot tube probe is made of rugged stainless steel or hastelloy depending on the application; a temperature and barometric pressure sensor come standard with the probe assembly to convert actual measurements to standard conditions for recordkeeping and reporting compliance.

The DELTAFLOW features 10/100 Ethernet interface including multilevel password protection for TCP/IP networks or the Internet. Client side user interface access is via a web browser.

## FLOW RATE INSTRUMENT

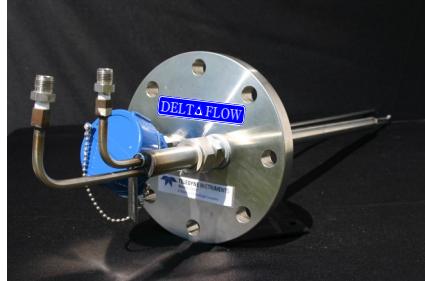
- ◊ Applications: Boiler, Furnace, Baghouse, ESPs, Cyclones, Turbines,.....
- ◊ Class 1 Div 2, ATEX Zone 2 Approved
- ◊ Modbus TCP Communication Protocol
- ◊ 30 Days Data Buffering, with RegPerfect Data Acquisition System
- ◊ Browser based Data Observing, Control, and Configuration



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## Pitot Tube Probe

Depending on the application, the pitot tube probe is constructed of stainless steel or hastelloy for easy cleaning and a long service life. A thermocouple temperature sensor is included in the probe assembly. The differential pressure measurement is performed using a pitot tube that is connected to a pressure sensor with Teflon tubing. Mounting is done by 4" flange; the tube is provided with an external indicator, so that its impact port can be accurately rotated to face directly into the gas flow.



## Instrument Enclosure

The optional instrument box enclosure is rated NEMA 4/IP66 as standard equipment but can be upgraded with purge protection to meet Class 1, Division 2, Zone 2 specifications; it can be mounted at the stack/duct , climate controlled shelter, or at grade level. Pressure and temperature transducers and a custom valve and manifold design are housed within the enclosure; these components provide precision calibrations and blow-backs to maintain reliable accuracy.

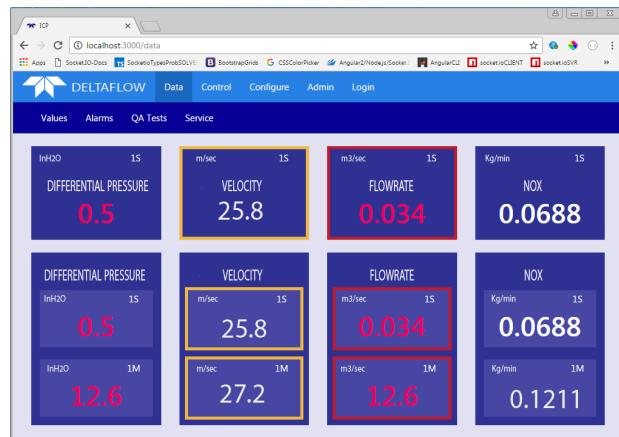


## Communications

The DELTAFLOW, Model DF180, Instrument Control Panel features 10/100 Based Ethernet interface as standard equipment. This capability provides a multi-level password protected interface to TCP/IP networks such as LAN's or the Internet. Client side user interface access is via standard web browsers. Simultaneous Modbus TCP access to instrument parameters and emission data is also supported.

## Web Browser Interface

The DELTAFLOW Ethernet web browser interface is used to view data, calibrations, alarms, configure, etc...



# SPECIFICATIONS

<b>FLOW MEASUREMENT</b>	Range Long Term Repeatability Relative Accuracy (vs. EPA Test Method 2)	0-300 ft/sec (0-91 m/sec) ± 0.3 ft/sec (± 0.1 m/sec) Site dependent, see Commercial Performance Warranty Typically < 5% above 10 ft/sec	
	Response Time Drift	5 seconds ± 1.5% of span over operating temperature range of instrument enclosure	
<b>MEDIA CONDITIONS</b>	Temperature Pressure Moisture	-40° to 1000°F (-40° to +538°C) ** -2 to 2 psig (-13.8 to 13.8 kPa) Dry to saturated, including condensed water	
	Particulate	≤ 3000 mg/m³	
<b>DUCT SIZE</b>	Diameter	From 1 - 45 Ft. (0.3 – 14m) Dia.	
<b>TEMPERATURE MEASUREMENTS</b>	Accuracy Long Term Repeatability	± 6 °F (-14.4°C) ± 0.5% of span per year	
<b>POWER REQUIREMENTS</b>		100-240 VAC, 50/60Hz, Single Phase, 800 VA Maximum	
<b>ENVIRONMENT</b>	Ambient Temperature Limits	Probe Assembly: -40° to +160°F (-40° to 71°C) Instrument Enclosure: +20° to 104°F (-6.7 to +40°C)	
	Relative Humidity	Probe Assembly: 5% to 100% humidity, condensing Instrument Enclosure: 0 to 95% non-condensing	
	Instrument Enclosure Ratings	NEMA 4/IP66 is standard, Ex Py purge protection can be added as an option for Class I Division 2, and Zone 2 applications	
<b>MOUNTING</b>	Process Connection	4" 150# ANSI flange	
<b>DIMENSIONS &amp; WEIGHT</b>	Instrument Enclosure	Size: 30H x 24W x 12D (inches), 76H x 61W x 30.5D (cm) Weight: 135 lbs. (61 kg)	
	Probe Assembly	Size: Application dependent Weight: 26 lbs. (11.8 kg), typical, application dependent	
<b>WEB INTERFACE HMI CHARACTERISTICS</b>	User Input Controls	Web interface	
<b>I/O AVAILABLE</b>	Analog Outputs	Number Isolation Type	2 Optical & capacitive barriers: channel to channel, channel to circuit common & earth
	Digital Inputs	Number Modes	4 Non-isolated (dry contact)
	Relay Outputs	Number & Type	4 SPDT, N.O./N.C. (Single Pole Double Throw, Normally Open and Normally Closed Contacts), 0-240VAC/VDC

\* Teledyne Monitor Labs reserves the rights to make changes in construction, design, specifications, and/or prices without prior notice.

\*\* High temperature applications, please consult factory.



## Training

An Operation and Maintenance Manual is provided with the DELTAFLOW DF180 Instrument. In addition, periodic hands-on training classes are offered at our Englewood, CO technology center. Training classes may also be scheduled at the customer's facility.



## User Support

TML maintains a user support line that may be accessed for assistance during normal working hours. A special 24-hour phone line is also available.

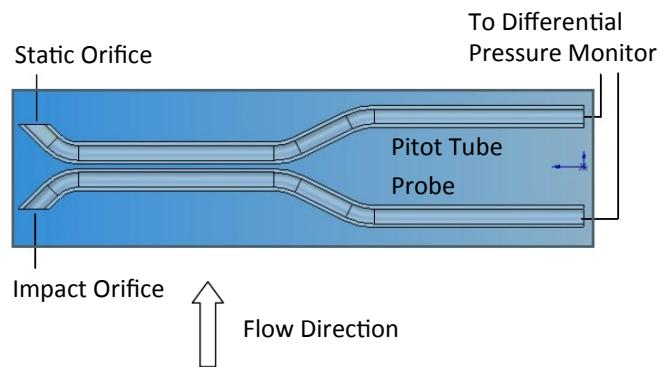


## Commitment

TML has over 45 years of experience in providing state of the art Continuous Emission Monitoring products to a wide variety of industrial markets. TML is dedicated to working in partnership with its customers to solve an application needs.

# How the **DELTA $\Delta$ FLOW** Works

The S-type Pitot tube is inserted into the stack and rotated until the differential pressure measurement is greatest for a given location in the stack. The proper orientation is for the S-type Pitot tube impact orifice tip to face directly into the direction of the stack gas flow.



Gas velocity is typically expressed in units of meters per second or feet per minute. The gas velocity calculation is a function of several variables including the differential pressure of the stack gas, the stack gas temperature, and the absolute stack gas pressure.

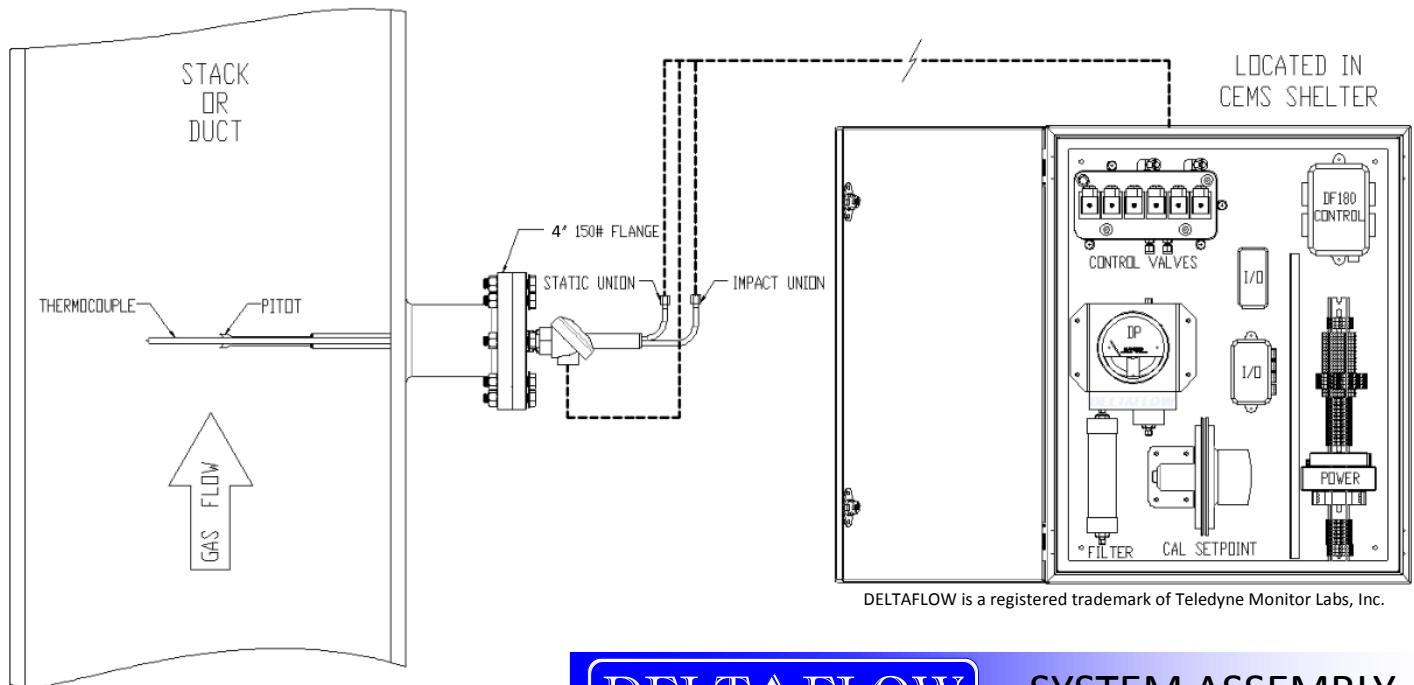
## Velocity Calculation

The basic formula is as follows:

$$V = K \times C \times \sqrt{\Delta P} \times \frac{\sqrt{T_{stack} + 273}}{\sqrt{M \times P}}$$

where

$V$  = stack gas velocity (m/s)  
 $K$  = pitot tube velocity constant (34.97)  
 $C$  = velocity pressure coefficient (for S-type pitot=0.84) (dimensionless)  
 $\sqrt{\Delta P}$  = square root of differential pressure of stack gas (mmH<sub>2</sub>O)  
 $T_{stack}$  = stack temperature (°C)  
 $M$  = molecular weight of stack gas, wet basis (g/g mole)  
 $P$  = absolute stack gas pressure (mm.Hg)



## **DELTA $\Delta$ FLOW** - SYSTEM ASSEMBLY

**Contact the TML Sales Team to ask about our gas instruments.**

Teledyne Monitor Labs, Inc. reserves the right to make changes in construction, design, specification, and/or pricing without prior notice.

**We offer a full regulatory, hardware and software support team to help you maintain environmental compliance.**

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ISO 9001 Certified Quality Management System

PL/DF180/01/18