Aviation

History of FloScan Aircraft Flow Transducers

In 1972, Aerosonics, (a leading U.S. avionics manufacturer at the time) began testing the Series 200 flow transducers to determine its suitability for use in general aviation aircraft. Prior to that time there had not been a generally acceptable transducer for this application. The company required a fuel flow transducer which would withstand the vibration of an aircraft engine. It also had to meet the important FAA regulation regarding blocked rotor pressure drop which could not be more than 1.5 times the spinning rotor pressure drop. Our design far surpassed the test requirement since a blocked rotor does not change the pressure drop of a FloScan flow transducer. For this reason, and because of their superior accuracy and extraordinary repeatability, FloScan transducers quickly become the dominate fuel flow measuring sensors for general aviation with over 250,000 units sold. In fact, the pilots of the record breaking, non-stop around-the-world flight of the "Voyager" in 1986, depended on FloScan transducers for accurate fuel flow measurement.

Series 200 Flow Sensor Specifications

Description:
Series 200 Turbine Flow Transducers measure flows of hydrocarbon fuels such as gasoline, kerosene, and #2 diesel fuel and other light transmitting, non-corrosive liquids of similar viscosity. Typical fuel flow applications include aircraft fuel monitoring systems; gasoline, diesel, and gas turbine engine test stands; and industrial furnaces.

The transducers give repeatable signals on gasoline across a 100 to 1 flow range down to 0.3 GPH. The higher viscosity of diesel fuel reduces signal repeatability at flow rates below 2 GPH. Pressure drops are very low compared to other turbine flow transducers. The transducer bearing system is rated for continuous operation at the upper end of the flow range.

The transducers produce a current pulse signal from an opto-electronic pickup with a preamplifier.

Principal of Operation:
Liquid enters the flow chamber tangentially, follows a helical flow path, and exits vertically, thereby venting any entrained vapor bubbles. The rotational velocity of the liquid is directly proportional to flow rate. A neutrally buoyant rotor spins with the liquid between V-jewel bearings. Rotor movement is sensed when notches in the rotor interrupt an infrared light beam between an LED and phototransistor.

The vapor venting design requires that the transducer be positioned with the electrical connectors pointing up. Turbulence caused by valves or sharp elbows mounted close to the transducer inlet can affect transducer K-Factor and should be minimized.

Performance Specifications:

Model Number	**201A-6**	**201B-6**	**201C-6**
Flow Range , Gasoline	0.3 – 30 GPH	0.6 – 60 GPH	2.0 – 80 GPH
#2 Diesel	2.0 – 30 GPH	3.0 – 60 GPH	8.0 – 80 GPH
Approximate K Factor (Pulses/Gallon @ 16 GPH), Gasoline	32,000	28,000 – 31,000	24,000
#2 Diesel	33,000	28,000	25,000

Pressure Drop, Gasoline	0.6 psi @ 15 GPH	1.2 psi @ 30 GPH	1.4 psi @ 40 GPH
	2.4 psi @ 30 GPH	4.8 psi @ 60 GPH	5.8 psi @ 80 GPH
#2 Diesel	0.8 psi @ 15 GPH	1.5 psi @ 30 GPH	1.8 psi @ 40 GPH
	3.0 psi @ 30 GPH	6.0 psi @ 60 GPH	7.2 psi @ 80 GPH
Repeatability Between Measurements	½% @ 16 GPH	½% @ 16 GPH	½% @ 16 GPH
Working Pressure	200 psi	200 psi	200 psi
Temperature Range	-65° / 100°C	-65° / 100°C	-65° / 100°C
Bearing Life Expectancy	10,000 hr. min.	10,000 hr. min.	10,000 hr. min.

NOTE: All flow transducers are tested and marked with K-factor at 16 GPH. Repeatability at 16 GPH is guaranteed to ½%. Transducers are available with calibrated K-factors at additional cost.

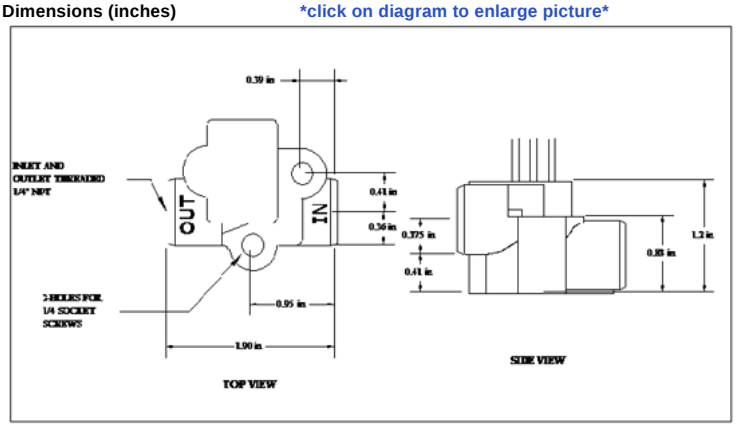
Material Specifications:

Flow Transducer Body	Die-cast Aluminum, Chem-Treated
Rotor	Rynite
Rotor Pivot	Stainless Steel
Phototransistor	SD 1440
Light Emitting Diode	SPX 4108
Connectors	20 Gauge Wire Leads (3)

Electrical Specifications:
12 to 15 VDC between RED (+) wire and BLACK (-) wire. 30 to 50 mA at 12 VDC.

Signal Specifications:
Open collector transistor output on WHITE wire. Sensor will pull-down to 1.0 volt with 10-15K ohm pull-up resistor installed.

Dimensions (inches) ***click on diagram to enlarge picture***



NOTE: FloScan reserves the right to change flow sensor specifications without notice.

Aircraft Transducer Terms and Conditions of Sale
(1) Flow Test Sensors. All goods received will be subject to Buyer's right to inspect and reject. Specifically, Buyer has 45 days from the date of receipt of the shipment of flow sensors
to flow test them. If the Buyer fails to inspect, test, or reject the flow sensors within the 45-day
period, then Buyer accepts the flow sensors as meeting the flow test specifications contained

in the sales order. If the Buyer rejects a flow sensor within the 45-day period because it fails to
meet the flow test specifications contained in the sales order, then Buyer may return it to the Seller, accompanied by the Buyer's flow test results. Seller will retest the flow sensor, and if it
fails to meet the flow test specifications contained in the sales order, then Seller will replace it free of charge. If the flow sensor passes the retest, then it will be returned to the Buyer in fulfillment of the order.

(2) Choice of Law. This sales order shall be governed by and construed in accordance with the
laws of the State of Washington. By placing this order, the Buyer irrevocably consents to the jurisdiction of the courts in the State of Washington with respect to any dispute arising from this order.

(3) Warranty. Seller warrants that all products delivered to the Buyer will be free from defects
in workmanship and materials, and shall conform to applicable specifications including performance specifications. The term of this warranty is 12 months after delivery to Buyer or to Buyer's customer, but in no case longer than 24 months from the Seller's shipment date from the factory.

Payment Terms
(1) All sales are stated in and due and payable in United States Dollars (USD).
(2) Unless stated otherwise on the invoice, goods are shipped "free on board" (FOB) Seattle, Washington, USA.
(3) Unless stated otherwise on the invoice, terms of sale are Net 30 days.
(4) Late payment outside the stated terms may be subject to a 1.5% monthly charge.

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