

# M2M: DP Flow

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# Product Family Introduction

## DS III Pressure Transmitter

**SIEMENS**



**Pressure transmitter**



**DP**



**Absolute-pressure transmitter**



**Liquid level transmitter**

# To Measure Flow .....

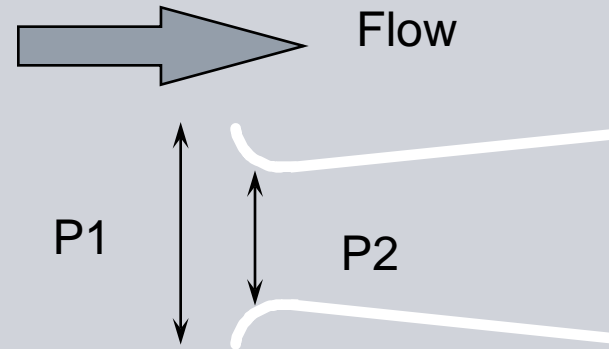
Flowmeter  
Technologies  
Knowledge of the  
application  
Knowledge of the  
process fluid



Bernoulli's Theorem

The Equation of Continuity

Osborne Reynolds



$$DP = P1 - P2$$

Flow is prop. to DP

# Bernoulli's Theorem (Conservation of Energy)

P = Static Pressure

$\rho$  = Fluid Density

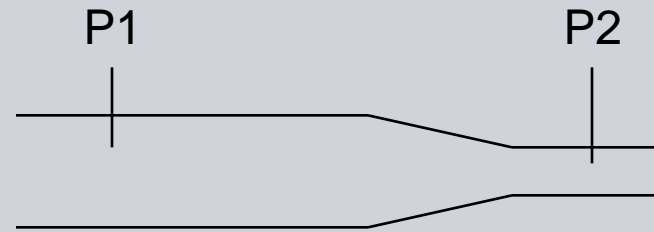
v = Velocity

g = Acceleration due to gravity

z = Elevation head

Sum of the static energy (pressure head), the kinetic energy (velocity head) and the potential energy (elevation head) of the fluid is

conserved in the flow across a constriction in a pipe



$$\frac{P}{\rho} + \frac{v^2}{2g} + z = \text{constant}$$

# Bernoulli's Theorem (Conservation of Energy) and the DSIII

Flow is proportional to the square root of the velocity!

Order the "Y02" in the DSII Part Number (MLFB)

<b>Calibrated range</b>	
Specify in plain text:	
▪ in the case of linear characteristic curve (max. 5 characters): Y01: X to Y psi, inH <sub>2</sub> O, ftH <sub>2</sub> O...	<b>Y01</b>
▪ in the case of square rooted characteristic (max. 5 characters): Y02: ... up to ... mbar, bar, kPa, MPa, psi	<b>Y02</b>

# Orifice Plates

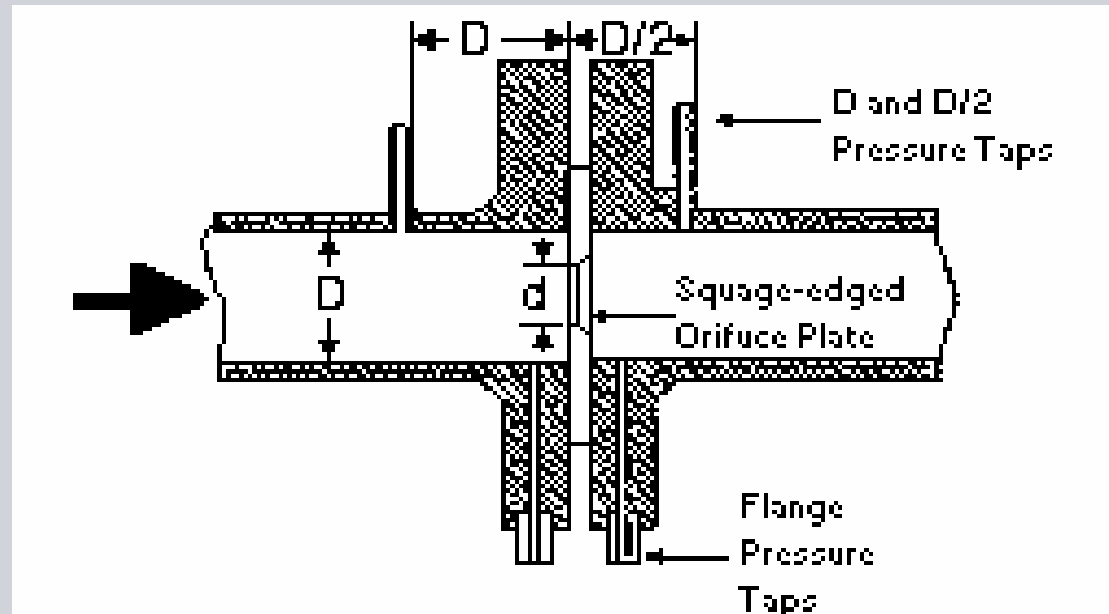
“The Industry Standard”

Most studied primary element

Concentric orifice is the simplest and least expensive

Price does not increased significantly

One disadvantage is large permanent pressure loss



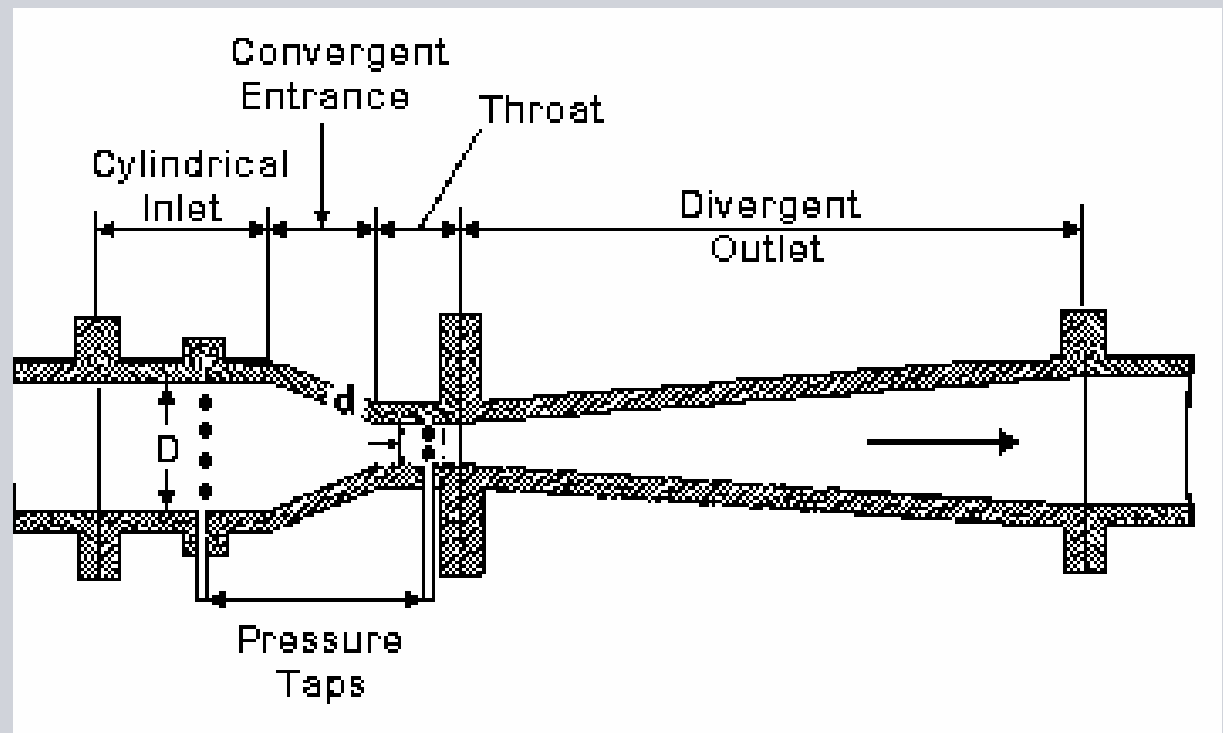
# Venturi Tubes

Exhibit very low pressure loss compared to orifice

For higher accuracy applications

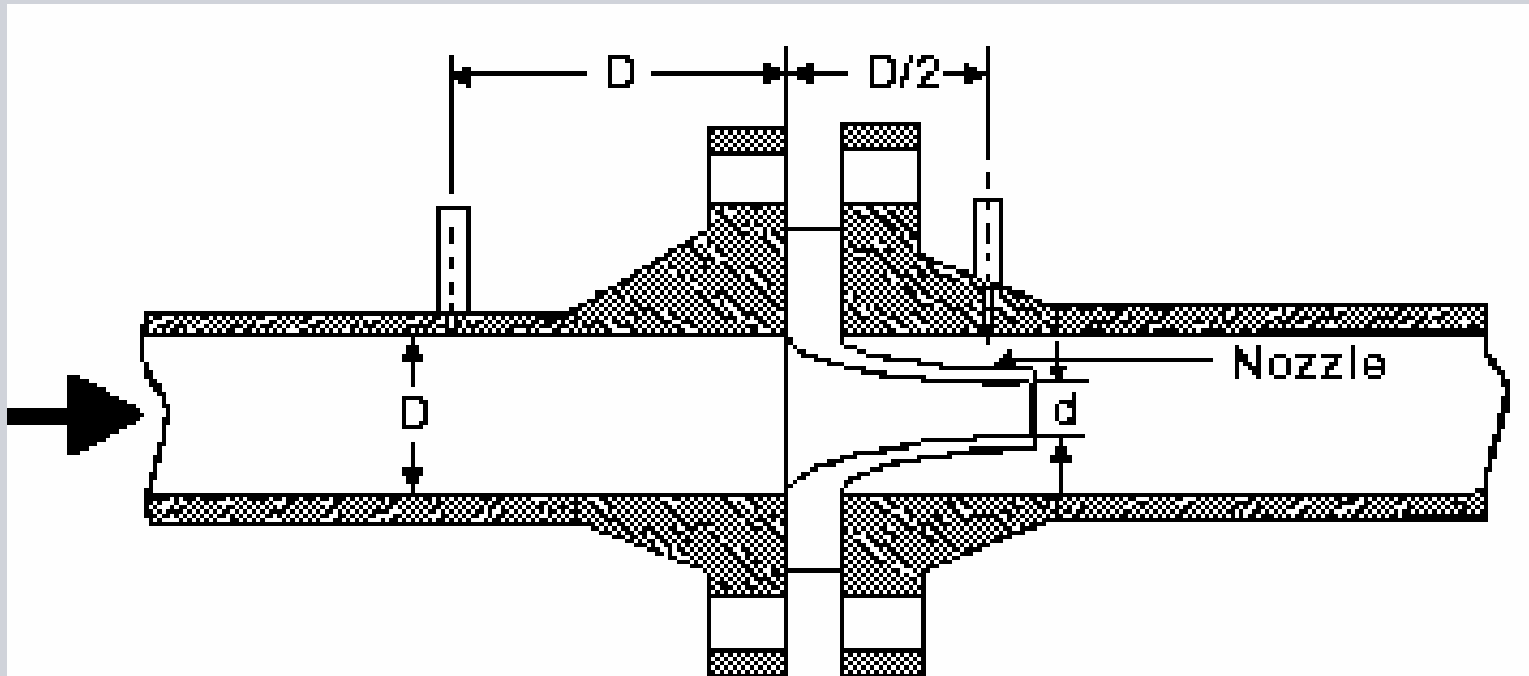
Common for large pipes like the Wastewater Industry

Initial cost is more than orifice





- Variation of a Venturi
- High velocity Flowmeter -  $Re > 50,000$
- Common in steam flow applications
- Pressure drop falls between orifice and venturi



# Averaging Pitot Tubes

- Lowest installed cost for primary element
- Very low DP per flow rate, almost requires a Draft range MV.
- Very low permanent pressure loss
- True Static Pressure (potential head) taken from low side of element
- One intrusion (including temp.)



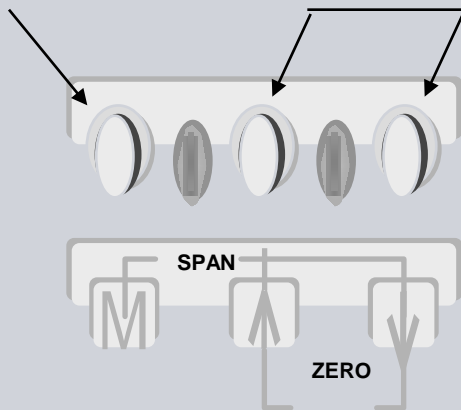
# 5 year Powered Warranty



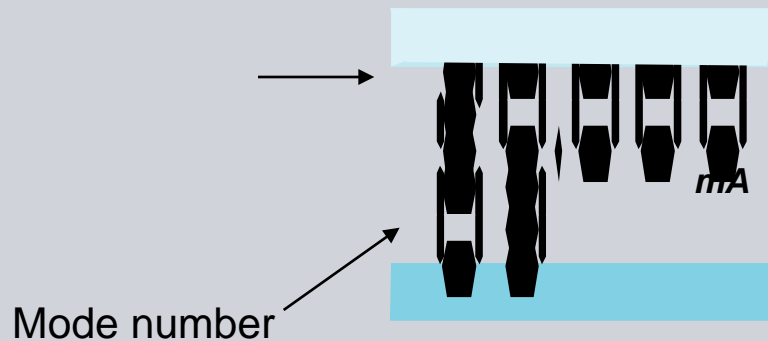
# Configuration with Magnetic Pushbuttons

Select Parameter with Mode Button

Change value of the parameter



Present value



# Siemens DS III

## World Class Diagnostics

- Operating Hours Meter
- Two Elapsed Time Meters
- Six -- Min / Max Registers
- Three Configurable Event Counters
- Output Current Alarms
- Simulation Output



# Siemens DS III

## Applications

### Product family

DP Transmitters are used in many flow applications

### Principle of operation

### Product overview

- ❖ Gas, Liquid or Steam Flow
- ❖ Pressures from atmosphere to >6000 PSI
- ❖ Temperature from Cryogenic to >1000 F

### Application

### Key features

- ❖ Used Everywhere, But Most Popular In
  - Refining & Petrochemicals
  - Oil & Gas
  - Power, both Utility and Industrial

# DP Flow Summary

- Largest installed base
- Fits any size pipe
- Variety of primary elements
- Orifice, Venturi, Nozzle, Pito...
- 0.75% - 2% accuracy
- Local set-up and diagnostics
- Liquids / Gas / Steam
- No liquid or gas restrictions
- Approvals FM/CSA Class I, Div I & II

