

Project Design Specification: EWH – Flow Meter
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Function: To measure the gas flow rate in medically useful ranges (0-15 Liters per minute) of single or continuous readout rates.

Client Requirements:

- less than \$2 each when mass produced
- single readout: 1x4x1”
- continuous readout: 4x4x1”
- accurate within 10%
- to be attached to an O₂, CO₂, or medical air source.

1. Physical and Operational Characteristics

- a. *Performance Requirements:* Will attach to a flow source tube at both ends. Must be reliable, to be used on a regular basis.
- b. *Safety:* Devices will be labeled with which type of gas they are measuring and sterilized after any contact with patient. Ends of meter will lock smoothly into source tube to prevent any injuries from sharp edges.
- c. *Accuracy and Reliability:* The flow meter needs to be accurate within 10% of the actual value with a reliability of 90%. An excellent device would allow for a value within 1% of the actual.
- d. *Life in Service:* It should have a life span of a minimum of 1 year before losing accuracy.
- e. *Shelf Life:* If it is electrical it should be able to be stored in hot and humid areas without electrical failure. It should also be able to be packed away for up to 6 months, and not decompose.
- f. *Operating Environment:* Needs to work in dry, dusty, humid, hot, cold, and rainy conditions without failure.
- g. *Ergonomics:* Needs to have a simple readout that shows when the gas is at the correct flow rate. People with little or no training should be able to use it.
- h. *Size:* The continuous readout flow meter should be no bigger than 4inX4inX1in, and the single readout flow meter should be no bigger than 1inX4inX1in.
- i. *Weight:* While there is no weight limit on the product, a lighter product will allow for cheaper shipping to consumers. Because the ultimate goal of the product is to create the flow meter as inexpensively as possible, a lighter product is preferable, but not if it comes with higher material cost.
- j. *Materials:* No material restrictions aside from cost.
- k. *Aesthetics, Appearance, and Finish:* Aesthetics are not a concern, as this product is to be produced as cheaply as possible for use in third world countries. The readout, however, should be clear and easy to read.

2. Production Characteristics

- a. *Quantity*: Produce one working prototype but able to mass.
- b. *Target Product Cost*: The target product cost for the project is less than \$2 each when produced in quantities of 500.

3. Miscellaneous

- a. *Standards and Specifications*: Local standards and international standards need to be met.
- b. *Customer*: The customer would ideally like the product to be accurate within 1%.
- c. *Patient Related Concerns*: There are no privacy or sterilization concerns.
- d. *Competition*: There are many similar products and patents, which can't be violated.