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NOTE REGARDING USE OF REGULATORS WITH NO PRESSURE REDUCTION

We are often asked what flow our regulators will allow when the pressure upstream of the regulator is the same as the pressure downstream of the regulator. However, physics prevents this from ever being the case. Any regulator will create a restriction of flow and to have flow through that restriction there must be a reduction in pressure in the flow direction.

If the upstream pressure is lower than the regulator's set pressure or flow downstream of the regulator prevents the downstream pressure from rising to the set pressure, then the regulator will simply be wide open and allow as much gas to flow as possible. How much gas flows is a function of the orifices within the regulator and the pressure drop across the regulator.

The Aqua Environment 415 regulator has an equivalent orifice size of 0.08 inches and the 873 series regulators have and equivalent orifice size of 0.23 inches. The orifice size for other Aqua Environment regulators and valves can be found in their respective Technical Bulletins.
see: http://www.aquaenvironment.com/partmodl.html

To calculate the flow to first order the equation in the Aqua Environment application note "Equations for Flow through Orifices" (see: http://www.aquaenvironment.com/appnotes/1099_AN_031111R.doc) can be used. However, the system designer will have to decide what pressure reduction is acceptable for the application in order to calculate the flow. Please note that these equations are for first order calculations only. If more precise flow requirements are to be met, then there is no substitute for measuring the flow in an actual system.

In summary, to estimate the flow through a restriction, regulator or other restriction, we must know the acceptable pressure drop across that restriction. No pressure drop means no flow – that is a law of physics. The larger the pressure drop the more flow will occur until the downstream pressure is half or less of the upstream pressure. When downstream pressure is half the upstream pressure you reach sonic flow which is the maximum flow through an orifice.

At Aqua Environment we are happy to assist in calculating the estimated flow. Please contact us if you have further questions.

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