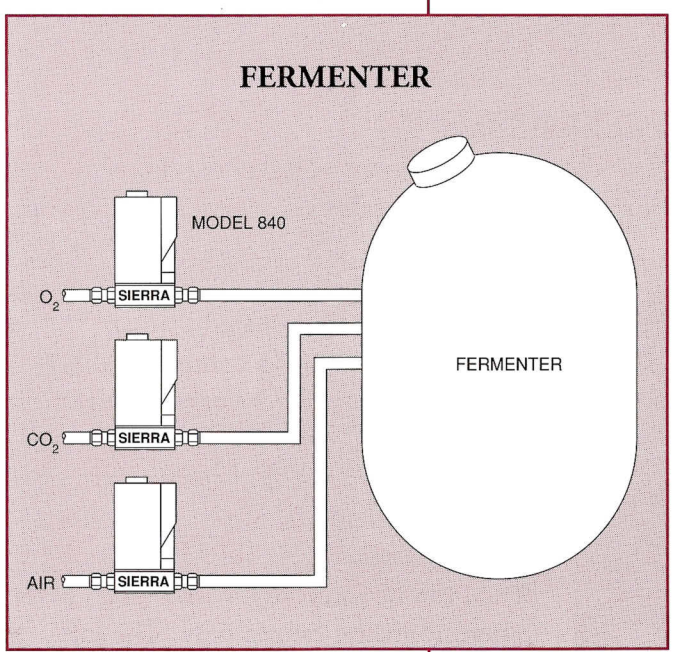
APPLICATION GUIDE TO MASS FLOW MEASUREMENT IN THE

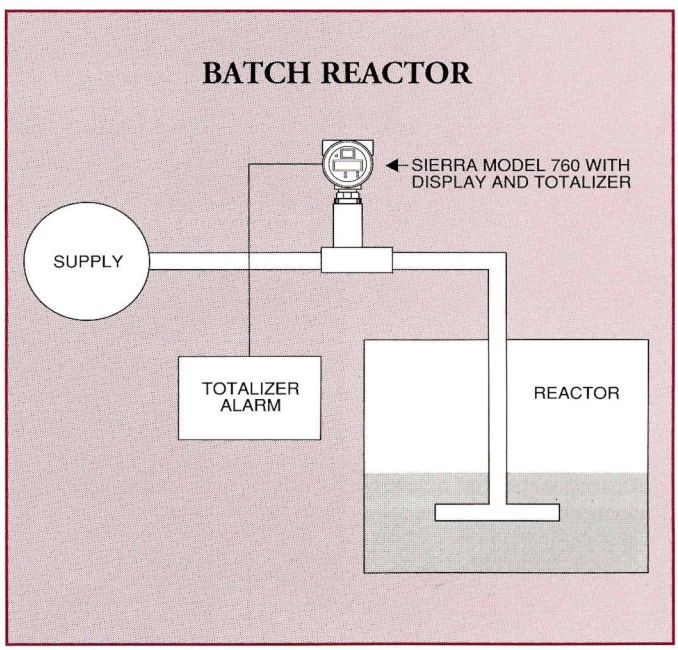
Pharmaceutical and Biotech Industries

Pharmaceutical and biotech companies can fine-tune costs, quality, and emissions if they are equipped with more effective measurement systems. Sierra mass flow meters and controllers provide precise measurement and control designed for process industries. They can make any plant more cost-effective in the following ways:

Controlling Gas Flow To Fermenters

The flow of gases to fermenters must be controlled to provide the proper environment for culture growth. Air, carbon dioxide, nitrogen, and oxygen are among the gases typically used for this purpose.





Sierra's Mass Flow Controllers are ideal for controlling the flow of gas into the fermentation vessel. The Sierra Model 840 maintains constant gas flow, regardless of pressure changes in the vessel. Its response and precision ensure repeatable batch-to-batch results and the greatest obtainable long-term stability.

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For areas that must be washed down, the entire flow controller is installed in a suitable NEMA enclosure. Sierra can also install a power supply in the enclosure to simplify installation.

A nitrogen flow controller can be used to control nitrogen for blanketing or purging the vessel.

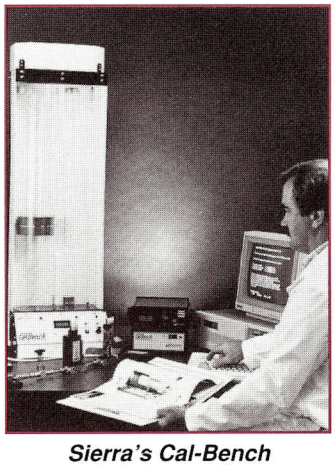
Repeatable Reactor Gas Flow Measurement

Sierra Mass Flow Meters can be calibrated for a wide variety of gases and used to measure flow to reactor vessels. The meter measures the mass flow rate directly and provides a linear output signal to a central computer system that monitors the material feed rate. Optionally, Sierra can provide a display and totalizer at the meter to display the momentary and total flow rates. For batch reactors, a totalizer alarm can indicate when a preset limit of mass flow to the reactor has been reached.

Ammonia is added during some processes to control the pH in the reactor. The Series 760 or 830 Mass Flow Meters are suitable for measuring ammonia flow. Both offer high accuracy and excellent repeatability.

In-House Meter Calibration

The traceability of flow devices to FDA is an industry requirement. Sierra offers both primary and secondary calibration systems to fill your specific needs.



Sierra's Cal-Bench

The Cal-Bench Automated Primary Calibration System is a complete calibration device that provides primary NIST traceability. Cal-Bench is suitable for calibrating any mass flow meter, mass flow controller, rotameter, or other flow device. For flow rates over 50 SLPM, the Cal-Bench can be integrated with a Bell Prover to permit greater rangeability. The software is very easy to use, provides for data storage and retrieval, and contains a complete gas table data base.

The Sierra Model 830 Mass Flow Meter provides an excellent transfer standard that is NIST traceable. Sierra can also design self-contained systems, utilizing a variety of flow meters for different flow ranges or gases.

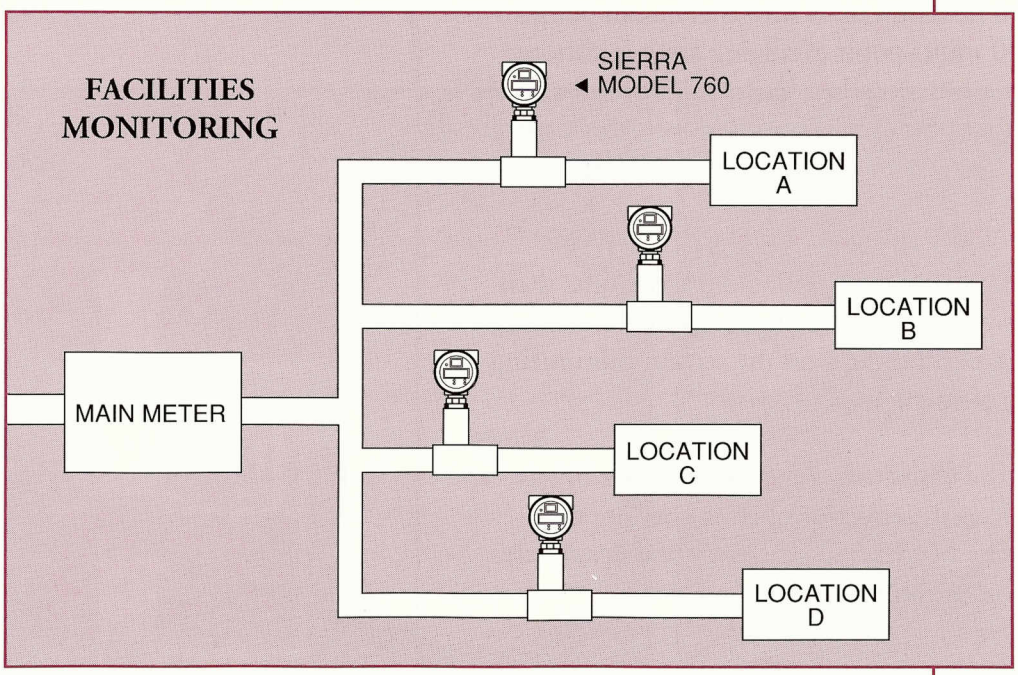
Controlling Dryer Air Flow

Fluid bed dryers and spray dryers are frequently used in the pharmaceutical industry. For both types, measurement and control of the inlet air flow is important to ensure that the process is repeatable.

The Sierra Single Point 640 and Multi Point 650 insertion mass flow meters are ideal for measuring air flow to the drying process. For additional control, a Series 640 or 760 mass flow meter can provide direct measurement of natural gas flow to the combustion burner.

Simplify Facilities Monitoring

Many plants are now sub-metering and totalizing the gas flow to each department, allocating costs according to actual use. Mass flow meters are ideal for this application. They provide all the advantages of direct mass flow measurement —plus high accuracy and rangeability that permit wide-range operation.



Sierra meters can include built-in totalizers or output the information to a central computer for totalization. They simplify departmental billing for the consumption of gases and even plant air.

A Sierra 760 can be used for smaller lines. For line sizes greater than eight-inches, an insertion type Series 640 single-point or 650 multi-point mass flow averaging system should be considered.

Maintaining Uniform Pill Coating

The air flow to pill coaters should be controlled to maintain uniform coating. Often, a central air system is used to provide air flow to several coaters. The resulting variations in flow can affect the drying rate and create differences in coating thickness.

The Sierra Model 640 is ideal for measuring air flow into each pill coater on a continuous basis. Sierra can also provide alarms that indicate that the flow rate has dropped below a selected level.

For ducts smaller than eight inches, Sierra provides a complete flow controller, including a flow meter and an integral butterfly control valve. The flow controller permits the operator to set the desired flow rate. It then regulates the air flow accordingly during the process.

Precise Monitoring Of Emissions

The measurement of emission flow rates may be required by OSHA or EPA. The Series 640 and 650 insertion mass flow meters can perform this function. Each Series 650 multi-point averaging array is custom built for the application after evaluating duct size, straight run length, number of probes, and number of points. The 650's averaging capability permits its use in applications where there is limited straight run and widely varying flow profiles.

The design of the sensor in both the Series 640 and 650 permits their use in applications where there are particulate-laden gases. The aerodynamics of the design carry the particles around the sensor, minimizing contamination of the sensing element.

Depending on the nature of the emissions, a thermal oxidizer or gas incinerator may be used to clean the emissions before they are discharged to the atmosphere. The Model 650 efficiently and accurately measures the air flow to the oxidation process.

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