

DATASHEET FLOW CONTROLLERS IN ICP ANALYSIS A111

APPLICATION NOTE

Flow controllers for ICP analysis

What is the role of flow controllers in ICP analysis?

ICP-AES analysis can be used to determine the concentration of trace metals or other elements in our environment. This elemental analysis technique makes use of an **inductively coupled plasma** (ICP) to generate excited ions and atoms, whose characteristic spectrum is measured by **atomic emission spectrometry** (AES). The intensity of the spectrum lines is a direct measure of an element's concentration, which can go down to ppb (parts per billion) range.

Bronkhorst closely cooperates with a major ICP-AES equipment manufacturer. For the plasma part, as well as for the optical part, manifold devices are used for inert gases to be supplied.



Application requirements

The plasma section of the ICP-AES needs an accurate, reproducible gas flow, whereas for the optical section, the required purge gas flow needs to be reproducible. Furthermore, the gas delivery device needs to be compact, with preferably a cost price as low as possible.

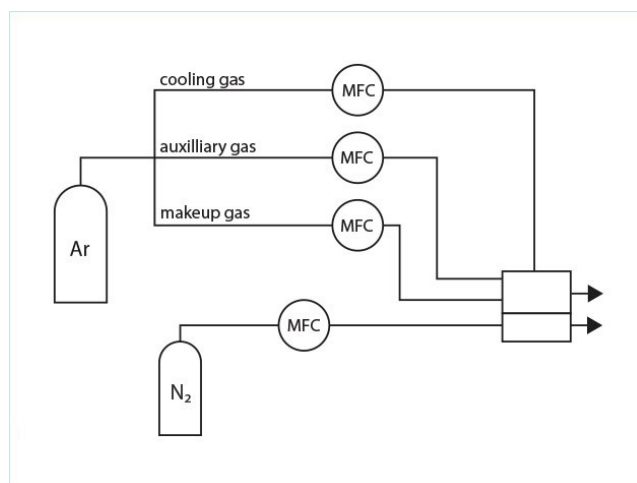
Important topics

- ICP analysis
- Accuracy combined with reproducibility
- Cost reduction
- Small footprint

Process solution

Through one of the three gas flow controllers, an argon gas flow enters the nebulizer of the ICP-AES for turning the sample into a mist. The other two gas flow controllers allow argon to enter the induction-coil surrounded reactor to be turned into a plasma, and for auxiliary purposes. The flow devices generate accurate, reproducible flows in the range of 1.5 litre per minute to 20 litres per minute. This accuracy is necessary for the contents inside the reactor to have a correct composition.

The Bronkhorst flow instruments are controlled by the lab equipment. However, the devices contain a printed circuit board with specific settings ('firmware'), to be able to communicate more easily with the ICP-AES.



Flow scheme

The purge part of the manifold consists of orifices combined with a pressure regulator to control the desired pre-pressure. Nitrogen gas flows, in the range from 0.2 liter per minute to 7 liters per minute, are used to purge the optical section of the ICP-AES, in order to guide away gases that might disturb the emission measurement process.

In the starting years of ICP analysis, the supply of gases was controlled manually. When automation has made its way into this field, also the control of gases was not spared, and mass flow controllers have been introduced. Such a good gas flow control has resulted in an increase in accuracy and stability, and lower detection limits became possible - which is a good point in meeting increasingly stringent environmental requirements.

The manifold is designed for an optimum value/price combination. Cost reduction is a driver in this market, and from the manufacturer's perspective one single supplier for gas related issues is favourable. A compact device has a small footprint, which is important due to the limited space in the lab. The small size of Bronkhorst mass flow controllers is useful here.

Recommended Products



MANI-FLOW

Compact assembly ensures space efficiency
Economical solution, low cost of ownership
Combination of functions on one manifold



IQ+FLOW IQF-200C MFC

Min. flow 0...10 mln/min
Max. flow 0...5 l/min
Pressure rating 10 bar
Ultra compact
MEMS technology



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