

# DATASHEET APPLICATION NOTE A007-CM04 - BURNERS - RATIO CONTROL

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## APPLICATION NOTE

### Ratio control in Burner & Furnace applications

Processes involving burners, such as **welding, cutting** or even **furnace** applications, require efficient management of the gas supply. Gas flow control is the key to successful combustion in these areas. Recognising the demands of these processes, Bronkhorst has developed gas flow control solutions for burner applications.



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#### Application requirements

For this type of process, it is essential that the oxidant/fuel mixture is reproducible. Also, it is essential to always supply a quantity of gas to avoid flame extinction or an increase in the amount of NO<sub>x</sub> (Nitrogen oxides) produced during combustion. When using natural gas (network), it is necessary to minimise the pressure drop of the flow controller. In addition, burner or furnace manufacturers are looking for solutions that are adapted to their machines, that are robust, easy to install and commission, and that offer different communication modes.

#### Important topics

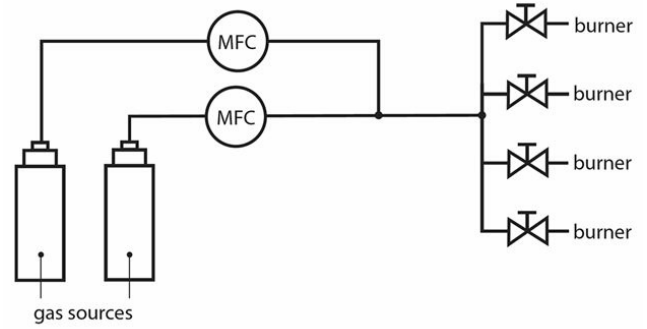
- Precise dosing of the delivered gases
  - Stability
  - Reproducibility
  - Flexibility
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## Process solution

### Management of the fuel/oxidant ratio

In combustion, two gases are often required: the fuel (methane, propane, or acetylene) and the oxidant (air or oxygen in case of oxy-fuel combustion).

To achieve ideal combustion and to maintain the dynamics of the burner, it is crucial to precisely control the ratio between the two gases. The stoichiometry of the reaction must be *controlled*, ensuring *complete combustion* of the air to avoid any safety problems. At the same time, to avoid excessive gas expenditure and to limit NOx emissions, the air supply to the reaction can be minimised.



Flow scheme

The Bronkhorst "master/slave" solution presented can successfully provide a proportional gas flow with the necessary stability. As the combustion gas is supplied by one flow controller (Master), the oxidant gas is delivered accordingly in the correct proportion by another flow controller (Slave), thus ensuring constant mixing. The instruments have a fast response time which, combined with the stability of the flow controllers, guarantees a constant flame.

This solution has the advantage of avoiding issues related to pressure conditions such as a dirty burner. Indeed, if the burner back pressure increases. The combination of flow meter, valve and control loop will compensate for this back pressure by acting on the valve opening of the instruments, thus maintaining the stability of the process. This action on the valve can be followed on a data acquisition system and allows prevention and limitation of production stops.

Our [MASS-STREAM](#) flow controller instruments are a perfect fit for these applications.

## Recommended Products



MASS-STREAM D-6380 MFM

Min. flow 10...500 l/min  
Max. flow 50...5000 l/min  
Pressure rating up to 20 bar  
Rugged sensor and housing (IP65)  
Optional integrated TFT display



MASS-STREAM D-6391/003BI MFC

Min. flow 40...2000 l/min  
Max. flow 200...10000 l/min  
Pressure rating up to 20 bar  
Rugged sensor and housing (IP65)  
Optional integrated display



MASS-STREAM D-6381/003AI MFC

Min. flow 10...500 l/min  
Max. flow 100...5000 l/min  
Pressure rating up to 20 bar  
Rugged sensor and housing (IP65)  
Optional integrated TFT display



MASS-STREAM D-6390 MFM

Min. flow 40...2000 l/min  
Max. 100...10000 l/min  
Pressure rating up to 20 bar  
Rugged sensor and housing (IP65)  
Optional integrated TFT display



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