

# MODEL 821S Gas Divider



The Signal Model 821S Gas Divider enables the users of gas analysers to test the linearity of their instruments - simply, quickly and accurately.

## Compliant

Conforms to:

- US EPA Method D 205
- US EPA CFR 40 part 1065
- EN14181 annexe B and AST
- ISO 13485-2016

## Accurate

- Uncertainty within 0.5%
- Constant output flow
- No change in flow with change in dilution

## Easy

- Simply connect the gases and rotate the selector switch

# MODEL 821S Gas Divider

## GAS DIVIDER - MODEL 821S

The Signal Group Gas Divider has been designed for testing the linearity of any gas analyser.

The MODEL 821S has ten identical capillaries and a precision balance regulator. The span gas can be selected to flow through a number of those capillaries with the diluent flowing through the remainder, to produce a ratio.

Many types of gas analyser are inherently non-linear due to the physical nature of the analysing technique. Photometric analysers (NDIR, NDUV, FTIR / spectrophotometers) need to be linearised before they leave the factory and then at regular intervals during service. Other more linear analysers will also need to be checked for linearity periodically whilst in service. This should be part of the QA/QC regime.



The Signal linearity tester has three key features:

1. **Utmost accuracy and repeatability**
2. **Absolutely no change to outlet flowrate whilst changing from one dilution step to another**
3. **Simplicity of operation**

Users simply connect the calibration gas, the zero gas and the outlet flow connector to the analyser to be tested, and then switch the calibration gas in 10 equal steps from zero to the full concentration. E.g. to test the linearity of a Carbon Monoxide analyser with a 500ppm calibration gas, switch through 50ppm, 100ppm, 150ppm, 200ppm, 250ppm, 300ppm, 350ppm, 400ppm, 450ppm and 500ppm. These steps will be accurate to within 0.2% and a calibration certificate is supplied with the instrument. Repeatability is 0.5% of the dilution step. The European standard EN14181 specifies 2% accuracy in annex B of document M20 and refers to a US EPA specification in Method 205 which also states that the test gas must be accurate to 2%. So, if the 10% dilution is selected, 500ppm will be diluted to 50ppm with an uncertainty of 0.25ppm - significantly better than the +/- 1ppm required by international standards.

If required, users can conduct a further check by exchanging the calibration gas tube connection with the zero gas tube connection and repeating the routine to obtain the same reading.

Mass flowmeters are not linear and need to be calibrated against a traceable standard flow. They are also affected by gas thermal coefficients that are different for each gas. Gas dividers, which are designed solely for testing gas analyser linearity, offer a simple and accurate solution.

The materials used are corrosion resistant 316 stainless steel and Nitrile, so the instrument can be safely used with most gases. Higher concentrations of calibration gases and percent levels may affect the dilution steps due to their viscosity, so the instrument automatically applies correction factors for this.

Details of US EPA Method 205 are available from <https://www.epa.gov/>

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ISO  
9001 : 2015  
REGISTERED

Cert No. 317012019

Specifications may be changed without notification

## SPECIFICATIONS

**DILUTION STEPS:** 0, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100% concentration of gas to be diluted.

**PRECISION OF EACH STEP:**  
Within 0.2%.

**UNCERTAINTY:** Within 0.5% of selected step.

**OUTPUT GAS FLOWRATE:** 1 litre/minute to 5 litres/minute.

**INPUT GAS PRESSURES:** zero gas: 2.5 bar, span gas: 2 bar.

**CORROSION RESISTANCE:**  
all wetted parts are 316 stainless steel or Nitrile.

**PRESSURE BALANCE:** electronic transducer with front panel gauge displaying pressure balance.

**REMOTE CONTROL:**  
optional RS232 interface.

**REMOTE CONTROL SOFTWARE:**  
optional software suite to allow fully automated test and relinearization of Signal series 4 analysers.

**POWER REQUIREMENTS:**  
220-250V AC or 110-120V AC.