



## Introduction

With the increasing use of hydrogen as an energy source, requirements for monitoring gas quality are gaining more attention. Sulphur compounds are among the most critical contaminants, as even very low concentrations can have a negative impact on sensitive catalysts, for example in fuel cells or chemical processes. The requirements for gas quality are defined in DVGW worksheet G260. Operators of hydrogen plants, electrolyzers, storage and pipeline infrastructures therefore need reliable analysis systems for the continuous monitoring of sulphur components. The analysis system described here is based on a combination of gas chromatography and ion mobility spectrometry (GC-IMS). Two IMS detectors operating in parallel enable particularly selective and sensitive determination of sulphur compounds at trace level. The system focuses on robust online analysis, minimal maintenance and easy interfacing with industrial process environments.



GC-TWIN-IMS of G.A.S.

In this application the system is customized for monitoring the most important sulphur-containing components in hydrogen. It detects:

- Hydrogen sulphide (H<sub>2</sub>S)
- Carbonyl sulphide (COS)
- Methyl mercaptan, ethyl mercaptan
- Tetrahydrothiophene (THT)

In addition to naturally occurring sulphur compounds, odourants are also reliably monitored, which is particularly relevant for applications at gas network transfer points or when feeding hydrogen into the grid. The measuring system can be expanded to detect additional compounds.

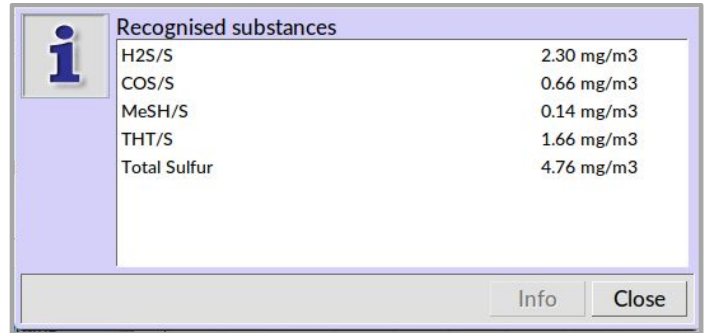
PARAMETERS	UNIT	LIMITS
Total sulphur (incl. odorization)	mg/m <sup>3</sup>	10
Total sulphur (without odorization)	mg/m <sup>3</sup>	6
Mercaptane Sulphur	mg/m <sup>3</sup>	6
H <sub>2</sub> S + COS (as sulphur)	mg/m <sup>3</sup>	5

Figure 1: Limits acc. to DVGW G260

The system is designed for fully automated operation. Measurement, evaluation and data provision are performed automatically and transferred to higher-level systems. This enables easy interfacing and direct integration into existing process monitoring and quality assurance systems by which excellent suitability for continuous online monitoring in industrial plants can be achieved.

## KEY FEATURES

- **Online monitoring** of sulphur compounds in hydrogen in accordance with DVGW G260
- Detection of the relevant components **H<sub>2</sub>S, COS, methyl mercaptan, ethyl mercaptan** and **THT** (tetrahydrothiophene)
- Measurement in the **µg/m<sup>3</sup> to mg/m<sup>3</sup>** range
- **Very low maintenance requirements** thanks to robust IMS detection
- **Automated measurement operation** with integrated data evaluation
- Direct integration into process control systems via **Modbus TCP**
- **Low gas consumption** and compact design
- Two parallel IMS detectors for **high selectivity** and stable measurements
- No sensitive optical components or additional consumables required
- **Long-term stability** - physical working principle
- **Low operating costs**



Recognised substances	
H2S/S	2.30 mg/m <sup>3</sup>
COS/S	0.66 mg/m <sup>3</sup>
MeSH/S	0.14 mg/m <sup>3</sup>
THT/S	1.66 mg/m <sup>3</sup>
Total Sulfur	4.76 mg/m <sup>3</sup>

Figure 2: Results displayed on screen. Results are also output via current loop or Modbus/TCP.

The results are displayed according to customers' requirements, based on individual compound concentrations, sulphur content of the individual sulphur concentration, total H<sub>2</sub>S+COS, mercaptan sulphur and total sulphur.

SPECIFICATION	
Dimensions (d x w x h) / mm	435 x 449 x 270
Inlets	3 mm Swagelok® Sulfinert®
Material hoses/valve	Sulfinert®
Data output	Modbus /TCP, current loop, USB, Ethernet
Sampling	6-port valve enables direct or bypass* sampling *integrated sample pump
Working principle	GC-IMS
System integrity	Hardware-Watchdog, Self-Check-Routines
Current / Power	<221 Watt/ 230 V
Gas consumption standby	N <sub>2</sub> : 1.5 mL/min corresponds to 154 month* synth. air: 50 mL/min Corresponds to 4.5 month*
Gas consumption per measurement	N <sub>2</sub> : 0.4 L Entspricht 5.8 Betriebsmonaten bei kontinuierlichem Messbetrieb* Synth. Luft: 1.8 L Entspricht 1.3 Betriebsmonaten bei kontinuierlichem Messbetrieb*
Cycling time	10 min

\*Based on the use cylinders of 50 L cylinders with a pressure of 200 bar.

