

### REDUCTION GAS DETECTOR CAPABILITIES

A reduction gas detector (RGD) has numerous unique characteristics when compared to traditional chromatography detectors. The RGD was originally developed and patented by Trace Analytical to measure minute concentrations, of hydrogen (H<sub>2</sub>) and carbon monoxide (CO) in normal air constituents (nitrogen, oxygen, carbon dioxide, etc.), inert gases (argon, helium) and saturated hydrocarbons at parts per billion by volume (ppbv) concentrations.

Since its commercial introduction in the mid-1980s, the RGD has been tested with numerous chemical species, as needed by new applications. Table 1 below lists compounds that are known to be measured by AMETEK's RGD analyzers. The typical lower detection limits of the RGD range from <0.5 to 25 ppbv for each listed compound.

COMPOUNDS THAT ARE SELECTIVELY DETECTED BY RGD		
INORGANICS	HYDROCARBONS	OXYGENATES
Hydrogen	Isoprene	Acetaldehyde
Carbon monoxide	Ethylene oxide	Formaldehyde
Arsine	Ethylene	Methanol
Phosphine	Acetylene	Ethanol
Silane	Propylene	Iso-propanol
Diborane	C <sub>4</sub> -C <sub>6</sub> unsaturates	Acetone
Carbonyl sulfide		Methyl-ethyl-ketone

Table 1. RGD detected compounds

### HOW DOES AN RGD ANALYZER WORK?

The basic operating principle of the detector is based upon the strong absorption of ultraviolet (UV) light by mercury vapor. Compounds eluting through the RGD-equipped analyzer pass through a heated mercuric oxide bed. In this bed, the reducing compounds in the sample (i.e. compounds that can combine with oxygen) react with the mercuric oxide, thereby releasing mercury vapor. This vapor is then measured by a photometric cell as a change in the absorption of UV light. The change in absorption is directly proportional to the concentration of the reducing compound within the sample gas.



AMETEK ta3000R, ta5000R, ta7000R

#### SALES, SERVICE & MANUFACTURING

##### USA - Pennsylvania

150 Freeport Road  
Pittsburgh PA 15238  
Tel: +1 412 828 9040  
Fax: +1 412 826 0399

##### USA - Delaware

455 Corporate Blvd.  
Newark DE 19702  
Tel: +1 302 456 4400  
Fax: +1 302 456 4444

##### Canada - Alberta

2876 Sunridge Way NE  
Calgary AB T1Y 7H9  
Tel: +1 403 235 8400  
Fax: +1 403 248 3550

#### WORLDWIDE SALES AND SERVICE LOCATIONS

##### USA

Tel: +1 713 466 4900  
Fax: +1 713 849 1924

##### Brazil

Tel: +55 19 2107 4100

##### France

Tel: +33 1 30 68 89 20  
Fax: +33 1 30 68 89 99

##### Germany

Tel: +49 2159 9136 0  
Fax: +49 2159 9136 39

##### India

Tel: +91 80 6782 3200  
Fax: +91 80 6780 3232

##### Singapore

Tel: +65 6484 2388  
Fax: +65 6481 6588

##### China

Beijing  
Tel: +86 10 8526 2111  
Fax: +86 10 8526 2141  
Chengdu  
Tel: +86 28 8675 8111  
Fax: +86 28 8675 8141  
Shanghai  
Tel: +86 21 5868 5111  
Fax: +86 21 5866 0969