

TECHNICAL NOTE

Using Ratios for Process Control

Residual Gas Analyzers (RGAs) have been used in vacuum research applications for 25 years. Their role has changed in the last 10 years, as they evolved from purely a research instrument to a production tool. As a production tool, the RGA can increase productivity, improve product yield, increase throughput and reduce costs, all of which ultimately increases profits.

It is up to the user to determine how the tool can best meet the needs of a specific application. INFICON, as an RGA manufacturer, can help users determine the most cost-effective ways to use RGAs. This Tech Note is concerned with using Ratios programmed from INFICON TWare32 software for added flexibility and process control.

USING RATIOS

The INFICON Transpector® software package TWare 32 (version 2.70 and above) includes a function that allows four ratios to be programmed as Special Peaks. These ratios can be displayed with other trend and mass data and can be used to drive Transpector set point relays. Relays activate based on the set point parameter range determined by the user.

Ratios can be implemented for a variety of purposes. For example, programming the ratio between Nitrogen at 28 AMU and Oxygen at 32 AMU could monitor for air leaks. A 4-to-1 ratio between the Mass 28 to Mass 32 peaks typically indicates air in the system. This ratio could be monitored in the Trend mode of TWare 32, or a set point relay could also be programmed to monitor this ratio and act within the set limits. This relay could drive an alarm, activate a valve, or operate some other process control.

Ratios can also be used to normalize data. Dividing a mass intensity of interest by another mass intensity that remains mostly constant throughout all process events serves to normalize the data, such that any change seen in the ratio will be a true reflection of a change in the process. Likewise for the air leak example above, this ratio can be monitored with regular mass data and it can be used to activate a set point relay for some type of process control.

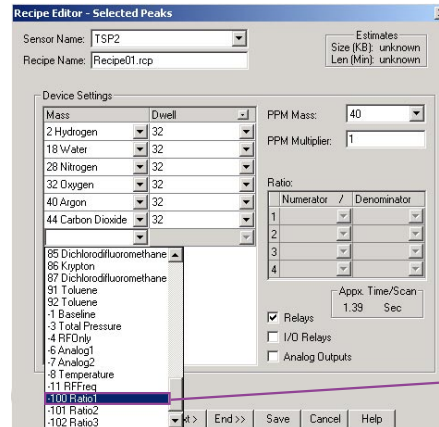
CPM System	CPM Valves	TSP	Relays	VSC-Valve	VSC-Reading	VSC-Pump	CPM
Sensor	Status	Process	Relay 1	Relay 2	Relay 3		
Preclude	Online	None	O	O	O		
TSP2	Online	Run	C	O	O		
XPR2	Online	None	O	O	O		

Relay activates when the ratio falls within its set point limits

PROGRAMMING RATIOS

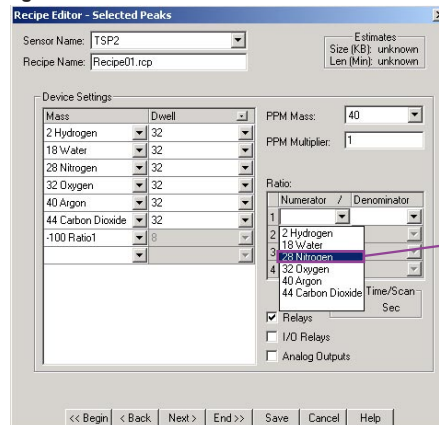
TWare 32 Ratios are programmed from the Selected Peaks page in the Recipe Editor. Once a Ratio has been chosen as a Special Peak, the user can program the desired Ratio. See Figures 1 through 4 below for the Recipe Editor screens:

Figure 1



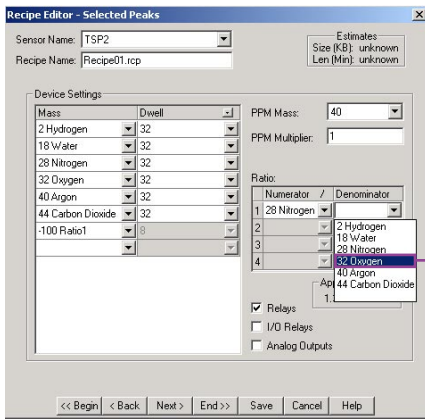
Select a Ratio to be a Special Peak

Figure 2



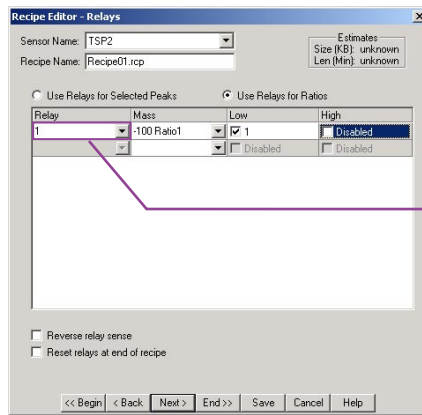
Select the Numerator Mass for the Ratio

Figure 3



Select the Denominator Mass for the Ratio

Figure 4



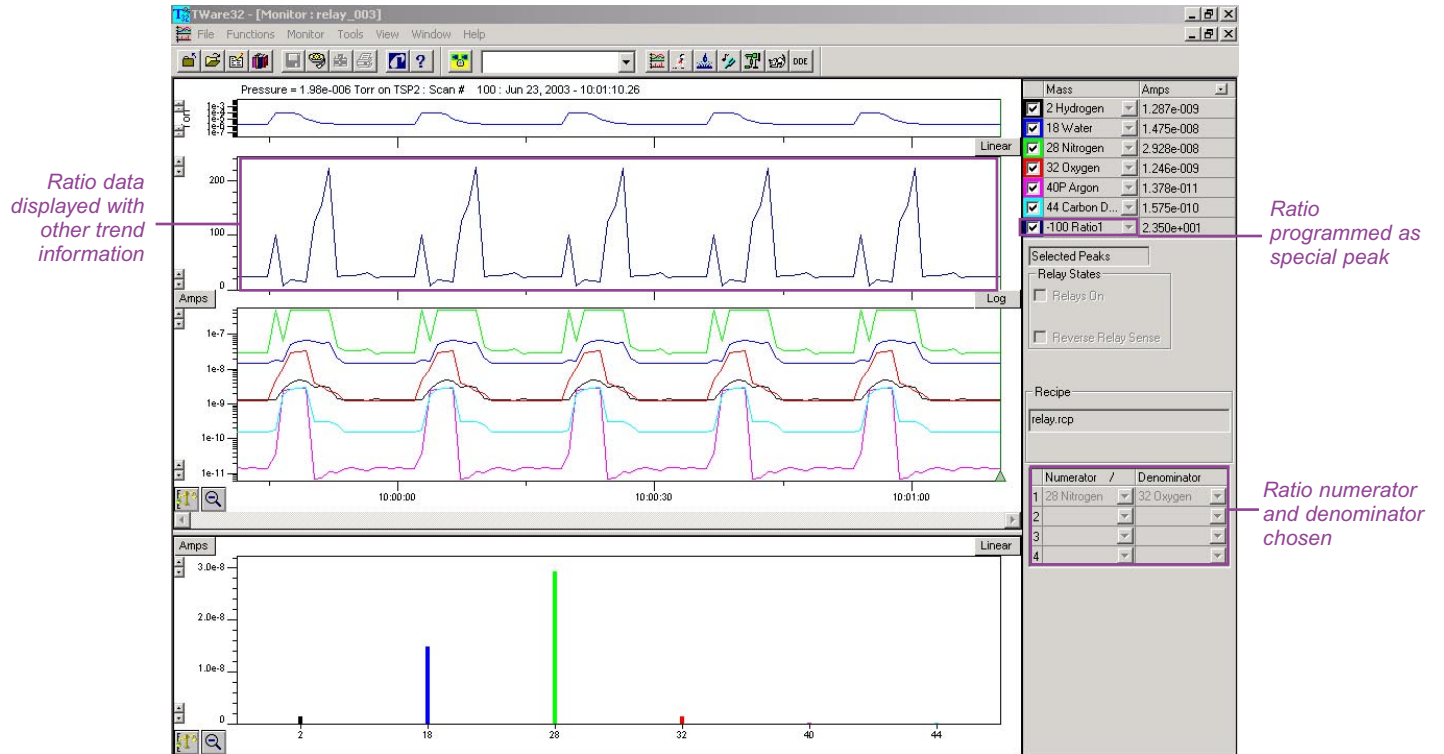
The Ratio can be assigned to a Set-Point Relay

DISPLAYING THE RATIO INFORMATION

Figure 5 illustrates how the Ratio information can be displayed with other Trend and Spectrum data from the TWare 32 screen.

Ratios will allow the user to monitor relative changes and compensate for changes in the residual gas analyzer, such as normal electron multiplier degradation.

Figure 5



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