

## OIL TANKERS AND LPG CARRIERS



### MONITORING FOR INERT SPACES

#### Application

An inert space is one that has been purged with engine exhaust, nitrogen, or other gas mixtures not containing oxygen. It is a common practice on board ships to purge the headspace above petroleum-based product, or in empty product storage spaces to prevent the accumulation of a flammable mixture in the space. For a flammable mixture or fire to exist there are 3 necessary components: fuel, oxygen, and heat or ignition. This is often referred to as the Fire Triangle. By removing the oxygen from the space it eliminates one of the three necessary components thereby preventing the possibility of a fire even if flammable vapors are present. In other words, if there is no oxygen present, there cannot be an explosion.

For these reasons it is important to know both the level of hydrocarbon vapors and oxygen present in the headspace or empty tank. The level of hydrocarbon or flammable vapors in these types of spaces will often exceed the LEL (lower explosive level) and can even be in the percent volume range. It is also important to monitor for oxygen concentrations in these types of spaces to assure a good purge.

#### Problem

The most common type of meter used to test for flammables utilizes a catalytic type sensor, which will sense combustible gases at LEL levels. This type of catalytic sensor requires oxygen in order to function. If there is no oxygen, or a very low oxygen level is present, the catalytic sensor will not work. The meter will give false readings and a false sense of security. Sometimes a dilution fitting is used with a catalytic sensor to blend some oxygen in with the sample in order to get around this problem. This method can work, but is prone to errors. If the dilution fitting is forgotten or if it is partially or fully plugged, then the operator will get false or inaccurate readings.

#### Solution

Riken Keiki has developed 2 instruments specifically for this type of inert space monitoring, the RI-415 and RX-415. These instruments use an infrared (IR) sensor to measure hydrocarbon vapors over 2 ranges; 0 – 100% LEL and 0 – 100% volume. The RX-415 will also measure oxygen in addition to the 2 ranges of hydrocarbons.

Unlike the catalytic sensor, the IR sensor is ideal for inert monitoring type of applications because the IR sensor does not require oxygen in order to function. The RI-415 and RX-415 instruments utilize a dual IR bench to permit accurate testing over the entire range of a target hydrocarbon up to 100% by volume. The dual autoranging allows the instrument to automatically switch from a 0 – 100% LEL range to a 0 – 100% volume range without any reconfiguring.

Also, for both the single gas model RI-415 and the dual gas (HC/O<sub>2</sub>) RX-415, there are two versions available. For petroleum type carriers like oil tankers, both models are available in a general hydrocarbon (HC) detection version. For natural gas type applications like LNG or LPG ships, both models have a methane (CH<sub>4</sub>) version. Both instruments come standard with built in sample drawing pumps and are explosion proof with intrinsically safe designs.

#### Ordering Information

The RI-415 and RX-415 are competitively priced instruments and come with a 3' coiled hose and probe. Both models are also available in kit forms, which include additional accessories like longer hoses with fittings, calibration gear, metal storage cases, gas sample bags, and additional filters. When ordering either of these instruments remember to specify which version you want, HC or CH<sub>4</sub>.



Model RI-415