

Biosystems now offers more than one type of chlorine (Cl<sub>2</sub>) and chlorine dioxide (ClO<sub>2</sub>) sensor. This application note will help you select the one that is right for your application.

### Cl<sub>2</sub> (Non-specific) & ClO<sub>2</sub> (Non-specific) Sensors

The Cl<sub>2</sub> (non-specific) and ClO<sub>2</sub> (non-specific) sensors are actually the same sensor. When calibrated to Cl<sub>2</sub> the sensor will respond to ClO<sub>2</sub> in a ratio of 1:3.1. As an example, if a Cl<sub>2</sub> non-specific sensor is exposed to 1 PPM ClO<sub>2</sub> the readout on the gas detector will be 3.1 PPM.

The OSHA short term exposure limits (STEL) for Cl<sub>2</sub> and ClO<sub>2</sub> relate to each other in approximately the same ratio. The OSHA permissible exposure limits (PEL) for an 8-hour time weighted average (TWA) for Cl<sub>2</sub> and ClO<sub>2</sub> relate to each other in a ratio of 1:5. The table below details the OSHA alarm setpoints for Cl<sub>2</sub> and ClO<sub>2</sub>.

| Substance        | STEL    | TWA     |
|------------------|---------|---------|
| Cl <sub>2</sub>  | 1.0 PPM | 0.5 PPM |
| ClO <sub>2</sub> | 0.3 PPM | 0.1 PPM |

Based on the relationships between the OSHA alarm set points and the relative response, one benefit of the Cl<sub>2</sub> (non-specific) / ClO<sub>2</sub> (non-specific) sensor is that the same sensor (with some degree of accuracy) can be used for the detection of both gases.

The Cl<sub>2</sub> (non-specific) and ClO<sub>2</sub> (non-specific) sensors do, however, exhibit some zero drift in transient humidity, which result in false alarm conditions.

### Cl<sub>2</sub> (Specific) Sensor

The Cl<sub>2</sub> (specific) sensor, as its name implies, is designed to have minimal cross sensitivity to ClO<sub>2</sub>. On the other hand the Cl<sub>2</sub> (specific) sensor is also not affected by humidity transients.

### ClO<sub>2</sub> (Specific) Sensor

The ClO<sub>2</sub> (specific) sensor, likewise, is designed to have minimal cross sensitivity to Cl<sub>2</sub>. It is very stable in transient humidity and offers 0.01 PPM resolution.

ClO<sub>2</sub> calibration gas is, however, not stable enough to be stored in compressed cylinders and unlike the ClO<sub>2</sub> (non-specific) sensor, which can be calibrated to Cl<sub>2</sub> as a surrogate gas, the ClO<sub>2</sub> sensor must be calibrated to ClO<sub>2</sub> from a ClO<sub>2</sub> generator.

### Conclusion

The table below lists the suggested sensor choice(s) based on the gas(es) to be detected

| Gas(es) to be detected                    | Best sensor choice(s)  |
|---|--|
| Cl <sub>2</sub> only                      | Cl <sub>2</sub> (specific)   |
| Both Cl <sub>2</sub> and ClO <sub>2</sub> | Cl <sub>2</sub> (non-specific) or Both Cl <sub>2</sub> (specific) & ClO <sub>2</sub> (specific) <sup>†</sup> |
| ClO <sub>2</sub> only                     | ClO <sub>2</sub> (specific) <sup>†</sup> or ClO <sub>2</sub> (non-specific)                                  |

<sup>†</sup> Requires the use of a ClO<sub>2</sub> gas generator for calibration

Biosystems sensors are identified by type using a 2-digit suffix. The suffixes for the sensors described in this application note are as follows:

|                                      |                                       |                                  |                                   |
|--------------------------------------|---------------------------------------|----------------------------------|-----------------------------------|
| Cl <sub>2</sub> (non-specific): "08" | ClO <sub>2</sub> (non-specific): "12" | Cl <sub>2</sub> (specific): "18" | ClO <sub>2</sub> (specific): "20" |
|--------------------------------------|---------------------------------------|----------------------------------|-----------------------------------|