



# ALTAIR® 2X, 4XR & 5X Gas Detectors & ALTAIR io™ 4 Gas Detection Wearable

Electrochemical Sensor Cross-Sensitivity Data\*

*It is quite common for electrochemical sensors to be cross-sensitive to specific gases other than the target gas of interest. Cross-sensitivities are limited as much as possible by sensor design, but some interactions still exist. The tables below are a general guide to these common cross-sensitivities which can be used to understand gas detector readings in environments where multiple gases may be present.*



## Using Cross-Sensitivity Data

Below you will find multiple scenarios to aid in the use of the provided cross-sensitivity data. It is important to note that cross-sensitivities are additive. Thus when the target gas and cross-sensitive gas are present, the sensor reading will combine both concentrations to provide a summed reading on the detector

| XCell CO Sensors                                |                    |                                       |                      |                               |                                |
|-------------------------------------------------|--------------------|---------------------------------------|----------------------|-------------------------------|--------------------------------|
| Scenario                                        | Gas in Environment | Environmental Gas Concentration (ppm) | CO Cross-Sensitivity | Gas Detector CO Reading (ppm) | Actual CO in Environment (ppm) |
| Target Gas Concentration                        | CO                 | 50                                    | 100%                 | 50                            | 50                             |
| Cross-Sensitive Gas in Environment              | NO                 | 50                                    | 84%                  | 42                            | 0                              |
| Target Gas & Cross-Sensitive Gas in Environment | CO/NO              | 50 CO/50 NO                           | 100% CO/ 84% NO      | 50 + 42 = 92                  | 50                             |
| Negative Cross-Sensitive Gas in Environment     | HCN                | 20                                    | -5%                  | -1                            | 0                              |
| Target Gas & Cross-Sensitive Gas in Environment | CO/HCN             | 50 CO/20 HCN                          | 100% CO/-5% HCN      | 50 + (-1) = 49                | 50                             |

## MSA XCell® Sensor Cross-Sensitivity Data\*

| XCell CO & CO-HC Sensors |                             |                      |              |
|--------------------------|-----------------------------|----------------------|--------------|
| Gas Applied              | Concentration Applied (ppm) | CO Cross-Sensitivity | CO Reading** |
| CO                       | 100                         | 100%                 | 100          |
| H <sub>2</sub> S         | 40                          | 0%                   | 0            |
| SO <sub>2</sub>          | 9                           | -4%                  | -1           |
| NO <sub>2</sub>          | 11                          | 0%                   | 0            |
| NH <sub>3</sub>          | 25                          | 0%                   | 0            |
| Cl <sub>2</sub>          | 10                          | 0%                   | 0            |
| NO                       | 50                          | 84%                  | 42           |
| HCN                      | 30                          | -5%                  | -2           |
| Toluene                  | 53                          | 0%                   | 0            |
| Isopropanol              | 100                         | -8%                  | -8           |
| H <sub>2</sub>           | 100                         | 48%                  | 48           |

| XCell H <sub>2</sub> S & H <sub>2</sub> S-LC Sensors |                             |                                    |                            |
|------------------------------------------------------|-----------------------------|------------------------------------|----------------------------|
| Gas Applied                                          | Concentration Applied (ppm) | H <sub>2</sub> S Cross-Sensitivity | H <sub>2</sub> S Reading** |
| H <sub>2</sub> S                                     | 40                          | 100%                               | 40                         |
| CO                                                   | 100                         | 1%                                 | 1                          |
| SO <sub>2</sub>                                      | 9                           | 14%                                | 2                          |
| NO <sub>2</sub>                                      | 11                          | -1%                                | -1                         |
| NH <sub>3</sub>                                      | 25                          | -1%                                | -1                         |
| Cl <sub>2</sub>                                      | 10                          | -14%                               | -2                         |
| NO                                                   | 50                          | 25%                                | 13                         |
| HCN                                                  | 30                          | -3%                                | -1                         |
| Toluene                                              | 53                          | 0%                                 | 0                          |
| Isopropanol                                          | 100                         | -3%                                | -3                         |
| H <sub>2</sub>                                       | 100                         | 0%                                 | 0                          |

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## MSA XCell® Sensor Cross-Sensitivity Data\* (cont.)

| XCell SO <sub>2</sub> (Single) Sensors |                             |                                            |                           |
|----------------------------------------|-----------------------------|--------------------------------------------|---------------------------|
| Gas Applied                            | Concentration Applied (ppm) | SO <sub>2</sub> (Single) Cross-Sensitivity | SO <sub>2</sub> Reading** |
| SO <sub>2</sub>                        | 24.5                        | 100%                                       | 25                        |
| CO                                     | 1000                        | 0.0%                                       | 0                         |
| H <sub>2</sub> S                       | 199                         | 0.1%                                       | 1                         |
| NO <sub>2</sub>                        | 10                          | -80%                                       | -8                        |
| NH <sub>3</sub>                        | 121                         | -0.1%                                      | -1                        |
| Cl <sub>2</sub>                        | 15.3                        | 0.7%                                       | 1                         |
| PH <sub>3</sub>                        | 5                           | 18%                                        | 1                         |
| HCN                                    | 50.4                        | 5%                                         | 3                         |
| Isopropanol                            | 500                         | 0%                                         | 0                         |
| H <sub>2</sub>                         | 2000                        | 1%                                         | 20                        |
| Acetylene                              | 100                         | 4%                                         | 4                         |

| XCell SO <sub>2</sub> (Two-Tox) Sensors |                             |                                   |                           |
|-----------------------------------------|-----------------------------|-----------------------------------|---------------------------|
| Gas Applied                             | Concentration Applied (ppm) | SO <sub>2</sub> Cross-Sensitivity | SO <sub>2</sub> Reading** |
| H <sub>2</sub> S                        | 40                          | 100%                              | 40                        |
| CO                                      | 100                         | 1%                                | 1                         |
| SO <sub>2</sub>                         | 9                           | 14%                               | 2                         |
| NO <sub>2</sub>                         | 11                          | -1%                               | -1                        |
| NH <sub>3</sub>                         | 25                          | -1%                               | -1                        |
| Cl <sub>2</sub>                         | 10                          | -14%                              | -2                        |
| NO                                      | 50                          | 25%                               | 13                        |
| HCN                                     | 30                          | -3%                               | -1                        |
| Toluene                                 | 53                          | 0%                                | 0                         |
| Isopropanol                             | 100                         | -3%                               | -3                        |
| H <sub>2</sub>                          | 100                         | 0%                                | 0                         |

| XCell CO H <sub>2</sub> -RES Sensors |                             |                                          |              |
|--------------------------------------|-----------------------------|------------------------------------------|--------------|
| Gas Applied                          | Concentration Applied (ppm) | CO H <sub>2</sub> -RES Cross-Sensitivity | CO Reading** |
| CO                                   | 100                         | 100%                                     | 100          |
| H <sub>2</sub> S                     | 40                          | 0%                                       | 0            |
| SO <sub>2</sub>                      | 9                           | -4%                                      | -1           |
| NO <sub>2</sub>                      | 11                          | 0%                                       | 0            |
| NH <sub>3</sub>                      | 25                          | 0%                                       | 0            |
| Cl <sub>2</sub>                      | 10                          | 0%                                       | 0            |
| NO                                   | 50                          | 130%                                     | 65           |
| HCN                                  | 30                          | -5%                                      | -2           |
| Toluene                              | 53                          | 0%                                       | 0            |
| Isopropanol                          | 100                         | -8%                                      | -8           |
| H <sub>2</sub>                       | 100                         | 5%                                       | 5            |

| XCell NO <sub>2</sub> Sensors |                             |                                   |                           |
|-------------------------------|-----------------------------|-----------------------------------|---------------------------|
| Gas Applied                   | Concentration Applied (ppm) | NO <sub>2</sub> Cross-Sensitivity | NO <sub>2</sub> Reading** |
| NO <sub>2</sub>               | 10                          | 100%                              | 10                        |
| CO                            | 60                          | 3.3%                              | 2                         |
| SO <sub>2</sub>               | 10                          | -86%                              | -9                        |
| H <sub>2</sub> S              | 20                          | -271%                             | -55                       |
| NH <sub>3</sub>               | 25                          | 0%                                | 0                         |
| O <sub>3</sub>                | 1                           | 100%                              | 1                         |
| HCN                           | 4.7                         | 2%                                | 1                         |
| Acetylene                     | 100                         | -1%                               | -1                        |
| H <sub>2</sub>                | 1000                        | -0.1%                             | -1                        |
| NO                            | 50                          | 3%                                | 2                         |
| H <sub>2</sub>                | 100                         | 0%                                | 0                         |

| XCell NH <sub>3</sub> Sensors |                             |                                          |              |
|-------------------------------|-----------------------------|------------------------------------------|--------------|
| Gas Applied                   | Concentration Applied (ppm) | CO H <sub>2</sub> -RES Cross-Sensitivity | CO Reading** |
| NH <sub>3</sub>               | 25                          | 100%                                     | 25           |
| CO                            | 45                          | 0%                                       | 0            |
| H <sub>2</sub> S              | 20                          | 75%                                      | 15           |
| SO <sub>2</sub>               | 10                          | -39%                                     | -4           |
| NO <sub>2</sub>               | 2                           | -74%                                     | -2           |
| H <sub>2</sub>                | 1000                        | 0%                                       | 0            |

| XCell NO <sub>2</sub> Sensors |                             |                                   |                           |
|-------------------------------|-----------------------------|-----------------------------------|---------------------------|
| Gas Applied                   | Concentration Applied (ppm) | NO <sub>2</sub> Cross-Sensitivity | NO <sub>2</sub> Reading** |
| Cl <sub>2</sub>               | 10                          | 100%                              | 10                        |
| CO                            | 45                          | 0%                                | 0                         |
| H <sub>2</sub> S              | 20                          | -0.7%                             | -1                        |
| SO <sub>2</sub>               | 10                          | -34%                              | -4                        |
| NO <sub>2</sub>               | 2                           | 19%                               | 1                         |
| H <sub>2</sub>                | 1000                        | 0%                                | 0                         |

\* These cross-sensitivity values are intended for reference only and may change under varying environmental conditions, varying concentrations, varying sensor lots, and varying sensor age. These tables do not contain a complete or inclusive list of cross-sensitive gases, but rather is a sampling of the most common examples.

\*\* All values have been rounded up to the nearest 1 ppm

\*\*\* Transient effect



## Cross-Sensitivity Data (Non-XCell Exotic Sensors)

| NO <sub>2</sub> Sensors |                             |                                   |                           |
|-------------------------|-----------------------------|-----------------------------------|---------------------------|
| Gas Applied             | Concentration Applied (ppm) | NO <sub>2</sub> Cross-Sensitivity | NO <sub>2</sub> Reading** |
| CO                      | 300                         | 0%                                | 0                         |
| H <sub>2</sub> S        | 15                          | -8%                               | -2                        |
| SO <sub>2</sub>         | 5                           | 0%                                | 0                         |
| NO                      | 35                          | 0%                                | 0                         |
| Cl <sub>2</sub>         | 1                           | 100%                              | 1                         |

| ClO <sub>2</sub> Sensors |                             |                                    |                            |
|--------------------------|-----------------------------|------------------------------------|----------------------------|
| Gas Applied              | Concentration Applied (ppm) | ClO <sub>2</sub> Cross-Sensitivity | ClO <sub>2</sub> Reading** |
| Alcohols                 | 1000                        | 0%                                 | 0                          |
| CO                       | 100                         | 0%                                 | 0                          |
| Cl <sub>2</sub>          | 1                           | 60%                                | 1                          |
| O <sub>3</sub>           | 0.25                        | 280%                               | 1                          |
| H <sub>2</sub>           | 3000                        | 0%                                 | 0                          |
| H <sub>2</sub> S         | 20                          | -25%                               | -5                         |

| PH <sub>3</sub> Sensors       |                             |                                   |                           |
|-------------------------------|-----------------------------|-----------------------------------|---------------------------|
| Gas Applied                   | Concentration Applied (ppm) | PH <sub>3</sub> Cross-Sensitivity | PH <sub>3</sub> Reading** |
| AsH <sub>3</sub>              | 0.15                        | 67%                               | 1                         |
| SiH <sub>4</sub>              | 1                           | 90%                               | 1                         |
| B <sub>2</sub> H <sub>6</sub> | 0.3                         | 35%                               | 1                         |
| GeH <sub>4</sub>              | 0.6                         | 92%                               | 1                         |
| SO <sub>2</sub>               | 5                           | 20%                               | 1                         |
| H <sub>2</sub>                | 1000                        | 0.1%                              | 1                         |
| C <sub>2</sub> H <sub>4</sub> | 100                         | 1%                                | 1                         |
| CO                            | 1000                        | 0.1%                              | 1                         |

| HCN Sensors                   |                             |                       |               |
|-------------------------------|-----------------------------|-----------------------|---------------|
| Gas Applied                   | Concentration Applied (ppm) | HCN Cross-Sensitivity | HCN Reading** |
| H <sub>2</sub> S              | 20                          | 300%                  | 60            |
| NO <sub>2</sub>               | 10                          | -180%                 | -18           |
| Cl <sub>2</sub>               | 10                          | 12%                   | 2             |
| NO                            | 50                          | 1%                    | 1             |
| SO <sub>2</sub>               | 20                          | 10%                   | 2             |
| CO                            | 400                         | 0.1%                  | 1             |
| H <sub>2</sub>                | 400                         | 0.1%                  | 1             |
| C <sub>2</sub> H <sub>4</sub> | 80                          | 0.1%                  | 1             |
| NH <sub>3</sub>               | 20                          | 1%                    | 1             |
| CO <sub>2</sub>               | 50000                       | 0.1%                  | 50            |

| NO Sensors       |                             |                      |              |
|------------------|-----------------------------|----------------------|--------------|
| Gas Applied      | Concentration Applied (ppm) | NO Cross-Sensitivity | NO Reading** |
| CO               | 300                         | 0%                   | 0            |
| SO <sub>2</sub>  | 5                           | 0%                   | 0            |
| NO <sub>2</sub>  | 5                           | 30%                  | 2            |
| H <sub>2</sub> S | 15                          | 10%                  | 2            |

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\*\* All values have been rounded up to the nearest 1 ppm

Note: This Bulletin contains only a general description of the products shown. While product uses and performance capabilities are generally described, the products shall not, under any circumstances, be used by untrained or unqualified individuals. The products shall not be used until the product instructions/user manual, which contains detailed information concerning the proper use and care of the products, including any warnings or cautions, have been thoroughly read and understood. Specifications are subject to change without prior notice. MSA is a registered trademark of MSA Technology, LLC in the US, Europe, and other Countries. For all other trademarks visit <https://us.msasafety.com/Trademarks>.

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