

Low Range Sensors

It is now possible to fit the madur flue gas analyzers with special sensors for low ranges. This has been done successfully on the GA-40plus and would apply equally to the GA-40Tplus. The modern regulations in many countries call for such small levels of emissions that this has proved essential in certain cases. Naturally this will increase the absolute accuracy of the measurement, since the relative accuracy remains the same, but the range is reduced.

The specific possibilities are as follows:

Carbon monoxide CO

A range of 0 – 300 ppm with a resolution of 0.1 ppm

This range of CO will cover the carbon monoxide emissions from most modern equipment, assuming nothing else is to be measured. Carbon monoxide emissions have been slashed dramatically in the past decade, with limits of 100 ppm carbon monoxide being the rule rather than the exception. Calibration can be carried out using a concentration of CO most appropriate to the application, otherwise we would recommend about 250 ppm carbon monoxide. These levels of CO are also useful for measuring conditions inside of small, enclosed and occupied spaces, such as vehicles.

Nitric oxide NO

A range of 0 – 50 ppm with a resolution of 0.1 ppm

NO emissions in this range are now possible with some combustion systems. Whilst nitric oxide is still often produced in the area of 100 ppm, low range burners are now available that will only produce about 30 ppm NO. Nitric oxide is also to be found from other sources and this low range sensor makes it possible to measure these as well. As a matter of interest, nitric oxide is also used in the treatment of asthma, and NO is to be found in the heart muscle. Nitric oxide still counts as a pollutant, even with these low ranges, so all attempts should be made to measure NO, even if the nitric oxide level is held to be within perfectly acceptable boundaries.

Nitrogen dioxide NO₂

A range of 0 – 20 ppm with a resolution of 0.1 ppm.

Nitrogen dioxide is heavily controlled nowadays and low range sensors may be needed in many cases where NO₂ is to be measured. Nitrogen dioxide belongs to the particularly unpleasant pollutants but NO₂ production will be reduced when NO emissions are also kept down. Nitrogen dioxide can also come from other processes, and the low range NO₂ sensors make it possible to also measure these factors. Calibration can be carried out with a gas of around 10 – 15 ppm NO₂, if available. Nitrogen dioxide is highly water soluble, so measuring these low ranges means strict control of the moisture content of any gas.

Sulfur dioxide SO₂

A range of 0 – 100 ppm with a resolution of 0.1 ppm

With modern fuels the level of sulfur dioxide has sunk radically in most countries. This is a great advantage in most cases, since SO₂ is a particularly unpleasant gas. A low range sensor for 100 ppm sulfur dioxide is adequate for most of these applications. Care must only be taken that the instrument is not used on coal fired power installations, which can have much higher levels of SO₂ in the emissions. Sulfur dioxide is generally only present when combustion of a fuel containing sulfur has taken place, so SO₂ is not to be expected under other circumstances. This can include the use of internal combustion engines, where the fuel may not be completely free of sulfur compounds. For this purpose a low range sensor for SO₂ will be essential since the sulfur dioxide level should be minimal.

Hydrogen sulfide H₂S

A range of 0 – 50 ppm with a resolution of 0.1 ppm

Hydrogen sulfide is a particularly unpleasant gas. The best known source of H₂S is rotting eggs, and this is the typical odor of this gas. Hydrogen sulfide is also to be found in biogas as a result of fermentation, and is responsible for the typical odor in swampland and similar areas. The H₂S must be measured, even if the level is relatively low. Combustion of hydrogen sulfide will produce sulfur dioxide and H₂S is a corrosive gas in its own right. Most applications such as sewerage measurement will require a low range sensor for hydrogen sulfide. It is important to remember that H₂S is a combustible gas and should be treated as such.

Sensors with these ranges are all available from madur electronics, and can be combined if necessary in many cases with standard ranges for other gases. Care must just be taken to consider cross-sensitivity effects which may completely blanket the result from another sensor in these low ranges if a high level of interfering gas is present. The soluble gases (NO₂, SO₂, and H₂S) must be considered carefully. Sensors for these low ranges will also require an appropriate gas preparation system capable of removing any moisture to preserve the gases for measurement.

Certain states, such as California, have much lower limits of pollutants than are otherwise common. If these limits are to be enforced effectively, then low range sensors will become essential equipment in flue gas analyzers. When used for other purposes, this may already be the case, since these gases can easily occur under other circumstances, which does not make them any less pollutant.