

The under practical application expected influences have been considered for construction of Integral Measuring Concepts (IMC) in order to achieve high reliability and low maintenance efforts. Already in basic configuration all important requirements for preparation of measured gas for the particular application are met. By means of the available options even special needs can be covered.

Some aspects have to be considered when installing the measured gas lines outside the IMC. Following this the background of the hints listed in the Instruction Manuals are described. Please keep in mind that under special operation conditions the individual case inspection cannot be replaced by these general descriptions. ExTox is at your disposal.

### **Coupling of the measured gas lines with the IMC**

The standard connections are prepared for plastic hoses with diameter 4/6 mm (inner/outer). The construction of the glands ensures protection against slipping of the hose and density even at high overpressure. Other connections such as for example olive connections can be prepared on demand.

### **Material**

The PE hose material used in the IMC is compatible with most of the gases. It does occur neither adsorption / absorption effects at the board of the hose nor is the material corroded by the gases. The PE hose material disposes already of protection against inadvertent damages and breaks. Furthermore it can resist pressure charges of more than 10 bars. ExTox recommends using hoses with minimum the same performance also for external measured gas lines.

All gas leading parts have to be considered. This comprises especially the connection at the sampling place, slider, valves or hose couplings. When using non consistent materials or alloys it can lead to falsification of the measured gas and with this to false analysis results, the measured gas line will be clogged by decomposition products or at least leaky. Hints on suitable / non suitable materials can be found in material recommendations for gas lines of the process to be monitored.

### **Length and Cross Section**

Length and cross section of the measured gas line determine the transport time of the gas sample from the sampling place to the IMC at the preset gas volume stream. To achieve fast response times hose length and diameter should not be selected unessential big. For too low dimensions the danger of clogging of the gas lines already exists by small dust or condensate charges. The material used by ExTox offers also for this case according to experience the best compromise in praxis.

### **Condensate Charge**

In case measured gas loaded with vapour, for example water, is leaded through an area with low temperature, the danger of condensate formation always exists. At these low measured gas streams of the analysis very short hose parts of some centimetres length suffice. For example the short piece till the wall duct into the inner building is endangered when sampling from a pipe which is installed directly outside the building.

Lines of metal dissipate heat more than lines made of plastic. Transparent plastic lines facilitate the visual control of the condensate and the degree of pollution.

### **Laying**

Slight quantities of condensate do not affect the measuring function of the IMC; this also comprises in particular transmitters with measuring principle IR-Absorption. To avoid the accumulation of bigger quantities the measured gas lines should be laid with incline to the process and convexities should not be formed. In this case the condensate will normally drain off, before a failure of the gas transport can occur.

At the gas outlet it has to be paid attention to the fact that the gases are drained off without danger. To ensure this the end of line is normally put at a place where sufficient dilution with

the environmental air is ensured, before it can reach the breathable air of humans or sources of ignition.

Outside the ends of gas outlet lines should dispose of a basic thermal insulation, as otherwise in winter icing can handicap the gas transport at the blow-off end even at very low formation of condensate.

### **Leakage**

The lines outside the IMC should be laid protected against mechanical damage. The hose material recommended by ExTox disposes of the basic protection mentioned above. At especially exposed places further protection such as for example the laying in a cable duct or protection pipe can be necessary. A regular visual control of the hose lines and connections is in any case premise.

If in spite of these measures a leakage occurs, the release rate is normally very limited due to the flow resistance in the sampling system and / or lapse of gas sampling by means of the pump. The natural or technical ventilation will inhibit occurring of explosion or health dangers due to sufficient dilution. Otherwise the use of an additional monitoring of ambient air can be checked.

Leakages in the IMC itself are come across by the integrated cross-flow ventilation that means one fan blows in the housing and the other one sucks. Ventilation is designed that way that even in case of breakdown of one fan and maximum sampling volume of the gas suction pump the measured gas released inside the IMC is diluted that way that no dangerous mixtures is formed. The fans are rotary speed monitored and the breakdown is indicated as fault of control unit. By these measures a two fault safety is achieved – that means the common occurring of a leakage and the breakdown of one fan do not lead to dangerous state.

### **Explosion Protection Technical Decoupling**

The components inside the IMC are not executed explosion protected. The decoupling of the monitored process for flammable gases eventually necessary is achieved via flame arrestor which is selected depending on the flammable gas. All parts before that in the gas flow are designed for an overpressure of minimum 10 bars<sup>1</sup>. This requirement is also valid for external measured gas lines. If the measured gas cannot be drained off without danger or returned into the process, a flame arrestor has to be installed also at the outlet.

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<sup>1</sup> Hintergrund: Der Druckanstieg bei einer Explosion ist erfahrungsgemäß auf maximal das 6-fache des Ausgangsdrucks begrenzt.