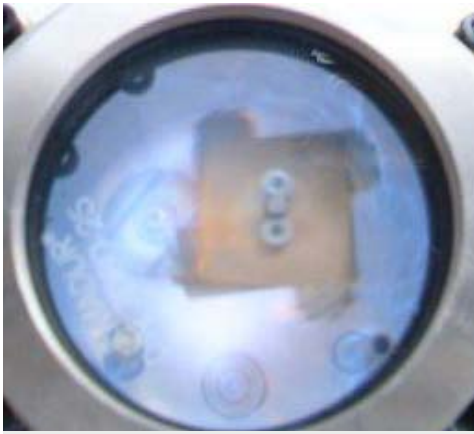


# Research – Explosive mixture composition

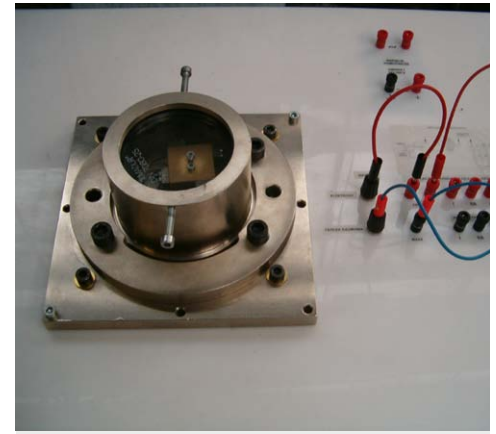
Application note A019H-UN02M03-0411B



**Accuracy, reliability and safety are requirements for instrumentation used in test equipment used in ATEX approvals procedures, when gas mixtures of precise composition are necessary.**

Using mixing in flow instead of buying ready mixtures makes test cheaper and logistic simple. Instead of 30 bottles with various, expensive mixtures supplied by gas manufacturers, only 6 bottles with single gases are required.

◆ **Final product is an ignition**



*Ignition chamber with rotating table and ignition electrodes.*

## Application requirements

System for Intrinsic safety test including gas delivery and mixing and ignition chamber acc. to BS EN 50020:2002.

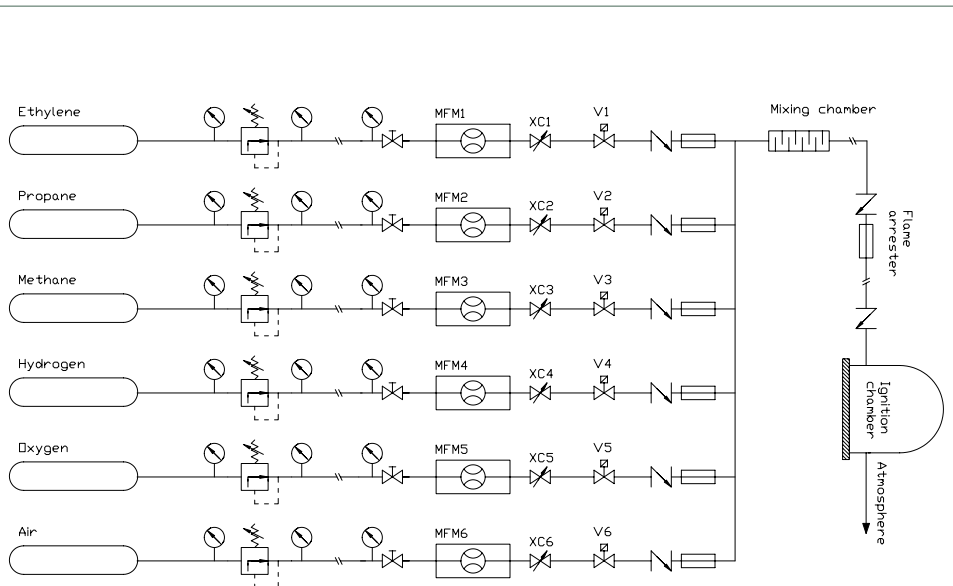
Explosive mixtures of certain composition has to be delivered to the ignition chamber in a certain time and amount. Each test can be

processed automatically or manually. After test completion ignition chamber is automatically purged.

### Important topics

- ◆ Accuracy of mixtures composition
- ◆ Safety : test by explosion
- ◆ Automation of test

## Process solution

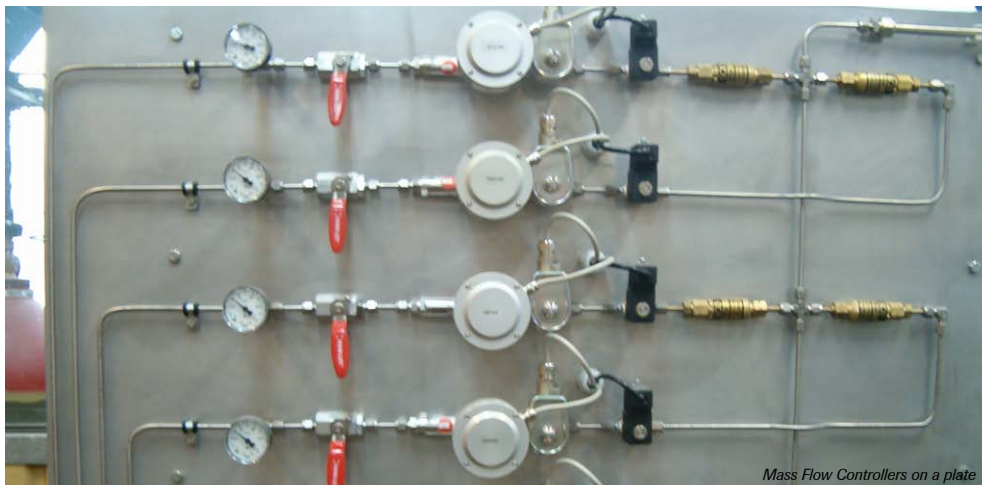


*A schematic technical diagram showing our product included in the customer's process*

### Intrinsic safety test

The intrinsic safety test apparatus consists of ignition chamber with electrodes system and delivery and mixing of gases system. Ethylene, Propane, Methane, Hydrogen, Oxygen and Air are delivered from gas cylinders and mixed on flow. Various explosive mixtures are produced according to BS EN 50020:2002. The mixture of required accuracy is used to fill ignition chamber, which has ignition turntable and electrodes system which can test if circuit under test can cause an explosion. Each test starts with checking ignition ability of mixture and electrodes. The RLC standard circuit have to cause explosion. Thus each test starts with explosion which requires certain safety precaution to avoid explosion in gas supplying lines and flow meters. Some redundant flame arresters are applied as well as check valve. ▶

The gases are delivered by Ex MFCs controlled by an E-7000 PS/Readout and a PLC which controls all the test timing and mixture composition. Some mixtures are pre-installed in the PLC, some other can be programmed by the user.



Mass Flow Controllers on a plate

## Recommended Products



### EX-FLOW Mass Flow Controller

EX-FLOW instruments are thermal Mass Flow Meters / Controllers of rugged design and suitable for gas flow application in hazardous areas. The intrinsically safe measuring head is tested according to ATEX 100a Directive 94/9/EC and approved under EC-Type Examination Number: KEMA 01ATEX1172, protection II 2 G Ex ib IIC T4. The housing of the electronics compartment is to IP65 classification.

- ◆ Flow ranges from 0,22 ml<sub>n</sub>/min up to 20 l<sub>n</sub>/min
- ◆ Accuracy with polynomial calibration: 0,5% Rd + 0,2% FS
- ◆ Explosion proof II 2 G Ex ib IIC T4
- ◆ Control valves: integrally or separately mounted.
- ◆ Rugged, weatherproof housing (IP65, dust and waterproof)
- ◆ Optional: low-ΔP versions up to 4...200 l<sub>n</sub>/min.



### IN-LINE Filters

Inherent to its construction, a thermal mass flow meter or controller for gases is sensitive to contamination. To increase the MTBF (Mean Time Between Failure) it is important to make sure that the gas entering the instrument is clean. The IN-LINE Filter Assembly, screwed into the inlet of the instrument, provides this service.

- ◆ In principle select finest porosity with low ΔP; preferably ΔP not higher than 250 to 500 mbar, and porosity not bigger than 5 μm.
- ◆ Choose a low-flow or medium-flow style filter for instruments with 1/4" female thread at the inlet; the high-flow filter is suitable for mounting into instruments with 1/2" female thread; the ultra-low-flow filters have 1/8" connections.



### IN-PRESS Industrial style IP65

IN-PRESS series, digital Electronic Pressure Transducers (EPT's) and Controllers (EPC's) with industrial style housing. Controllers to be specified for forward or backward pressure control. With analog or digital output, elastomer sealed. Pressure ranges from 0-100 mbar up to 0-400 bar.

- ◆ Thru-flow design
- ◆ Compact arrangement
- ◆ Suitable for liquids and gases
- ◆ High pressure capability up to 400 bar
- ◆ Classifications IP65
- ◆ High accuracy and repeatability



### IN-FLOW Industrial style IP65

IN-FLOW Series Mass Flow Meters/Controllers are thermal mass flow meters of modular construction with a 'industrial style' pc-board housing. Control valves can either be integrally or separately mounted, to measure and control gas flows from: lowest range 0,2...10 ml<sub>n</sub>/min up to highest range 220...11000 m<sup>3</sup><sub>n</sub>/h

- ◆ High accuracy (typical 0,8% of Rd plus 0,2% of FS)
- ◆ Pressure ratings up to 700 bar (higher on request)
- ◆ Electro-chemical polish of all surfaces
- ◆ Rugged, weatherproof housing (IP65, dust and waterproof)
- ◆ No moving parts
- ◆ Analog or digital communication (RS232 or fieldbus interface)

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### Explosive mixture composition

A019H-UN02M03-0411B

UN : University and Research Institutes  
02 : Research Institutes  
M03 : Mixing gas