



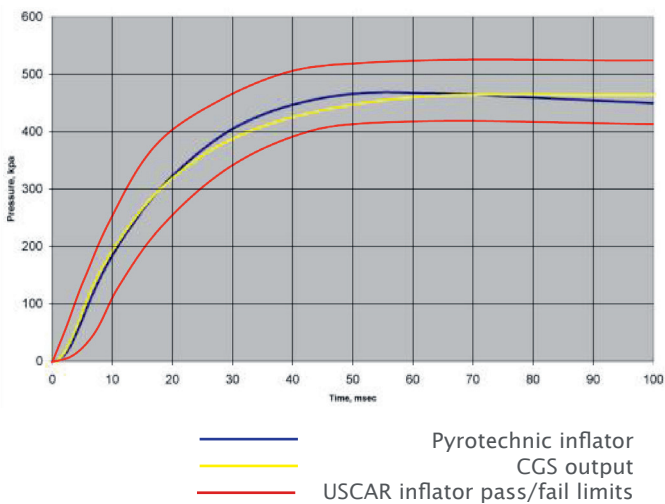
# Cold Gas Inflation System

- Replacement for pyrotechnic, hybrid & cold gas inflators
- Available in single-stage and dual-stage versions
- Electronic firing valve with  $<200\mu\text{s}$  firing delay
- Adjustable gas flow rate and pressure. 1% repeatability
- Uses helium, nitrogen, argon or gas mixtures

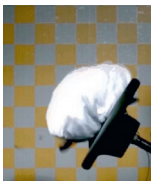
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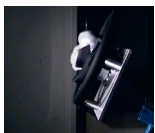
When tuned for cover testing, the CGS output pressure curve closely follows the pyrotechnic inflator curve during the initial 20ms. The corresponding high speed video demonstrates the accuracy of the CGS as a pyro replacement.



Pyrotechnic Inflator



Cold Gas System



3 ms, 5 ms, 7.5 ms and 10 ms

## The Cold Gas System...

... replaces pyrotechnic, hybrid and cold gas inflators, saving both money and time. Superior technical performance allows for better, more innovative product designs.

By charging the CGS with a mixture of helium and nitrogen it is possible to very closely reproduce the performance of pyrotechnic and hybrid inflators.

## Example #1: Airbag Module Development

Using the Microsys Cold Gas Inflation System to replace inflators in the airbag module development process results in significant cost savings by eliminating the majority of prototype inflators used for testing the design. Also, with the 1% repeatability of the CGS, engineers are able to quickly ascertain the effect of design changes, resulting in shorter schedules and a better product.

## Exp. #2: Instrument Panel (IP) and Airbag Cushion R&D

For interiors companies developing seamless instrument panels or seats, and for cushion designers, the Microsys Cold Gas Inflation System can replace inflators for most R&D testing. This allows engineers to easily adjust the airbag speed and pressure to determine the effect on their product, which is impossible to do using live inflators. Compared to using inflators the Microsys Cold Gas Inflation System offers more than better product designs; it is also far more repeatable, allows for faster cycle times, and saves the cost of expensive live airbags.

## Exp. #3: To Replace an inflator for Production Testing

In this mode the Microsys Cold Gas Inflation System is an inexpensive, adjustable and repeatable replacement for an actual inflator. Prior to using the System performance must be calibrated by connecting the output to a test tank, typically either 60L or 28.3L. The Cold Gas Inflation System settings are adjusted until the test tank pressure curve is equivalent to the pressure curve of the inflator it is replacing. At this point the Cold Gas Inflation System may be connected to an airbag for deployment. Seamless IPs and seats can be tested with the CGS for a small fraction of the price of real airbags.

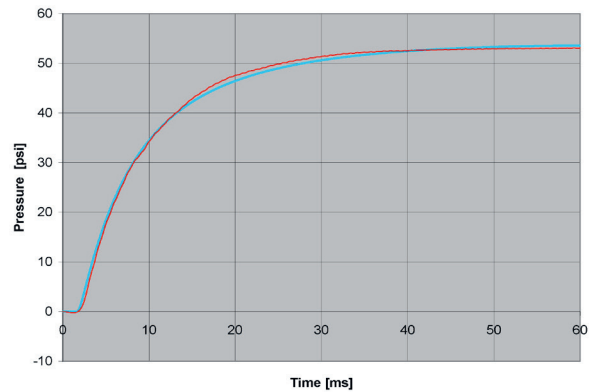
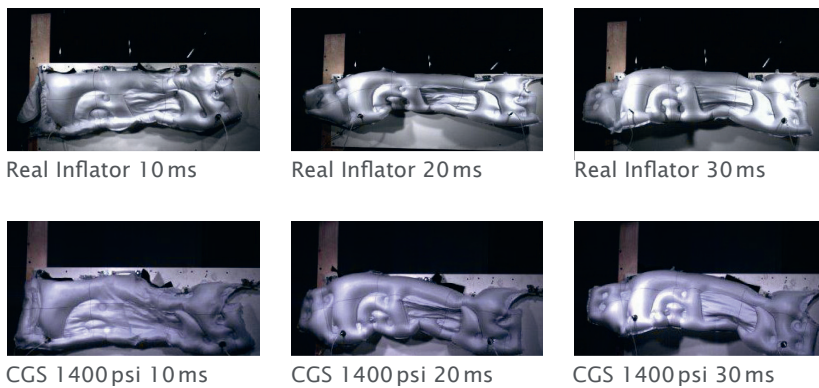
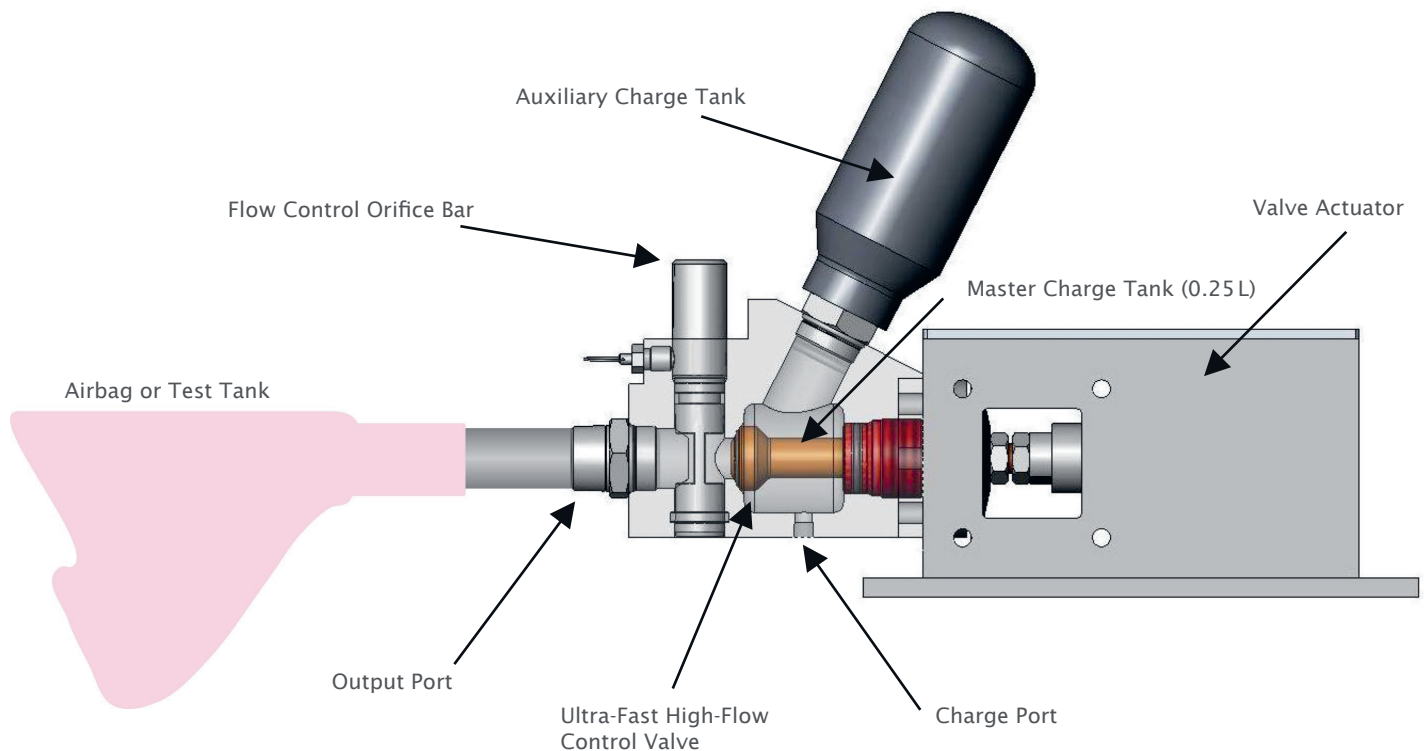
## Gas Mixtures

The three primary effects on airbag performance that result from the hot gas produced by pyrotechnic inflators are: pressure build-up, cushion leakage and the jetting effect. The optimum ratio of helium to nitrogen to use with the CGS depends on which of these effects is of primary interest.

When using the CGS to examine cover break-through, cushion fold or for OOP, the pressure build-up and jetting effect are the main factors. Using a test tank the CGS is charged with a mixture of Helium and Nitrogen, then tuned to match the rise time of the inflator, as shown in the graph on the right.

For impactor testing, charging the CGS with a predetermined mixture of Helium and Nitrogen closely simulates the cushion leakage effect.

**The Cold Gas Inflation System (CGS)** is used in Research & Development testing of airbags, cushions, instrument panels and seats. Using the CGS in place of inflators gives you an accurate and repeatable test instrument with the flexibility to modify the gas output flow rate and pressure, resulting in improved product designs. Significant cost and time savings are realized by reducing the use of expensive and long lead time prototype inflators. The Cold Gas System is based on Microsys patented ultra-fast valve technology.



The Microsys Cold Gas Inflation System is a natural replacement for stored gas inflators

# Cold Gas Inflation System

## Performance Specifications

- Master charge tank volume: 0.25L
- Auxiliary charge tank volume: 0.25L, 0.5L, 0.75L, 0.95L, 1.9L, 3.8L  
Charge tank volume  $\pm 1.5\%$
- Working gas pressure: 5~20.7MPa, adjustable to  $\Phi 1\%$
- Gas volume: 0.5~8 Moles (determined by working gas pressure & total charge tank volume)
- Working Gas: Helium, Nitrogen, Argon, Mixtures
- Valve Opening Time:  $\Phi 2$  ms (electronic firing version)  
 $\Phi 5$  ms (pneumatic firing version)  
Pneumatic version open time varies slightly with charge pressure
- Valve Opening Delay:  $\Phi 200$   $\mu$ s (electronic firing version)  
50~150 ms (pneumatic firing version)
- Valve Programmable Timing: 0 to 900ms, 0.1 ms increments
- Valve Outlet Diameter: 25 mm
- Performance Repeatability:  $\Phi 1\%$
- Standard Orifice Bar: 10.2, 12.7, 15.2, 17.8, 20.3 mm
- Hole Diameters: (0.4, 0.5, 0.6, 0.7, 0.8 inch)
- Operator Interface: Color LCD touch screen
- Mechanical Buttons: Arm, Stop, Fire, E-Stop
- Complies with EU Pressure Equipment Directive 97/23/EC

## Ordering Information

### MT4200-102: Dual stage electronic firing cold gas system

- Includes 6 auxiliary charge tanks: 2 each of 0.25 liter, 0.5 liter, 0.75 liter
- Includes 10 fixed size orifice bars and 4 user customizable orifice bars

### MT4200-101: Single stage electronic firing cold gas system

- Includes 3 auxiliary charge tanks: 0.25 liter, 0.5 liter, 0.75 liter
- Includes 5 fixed size orifice bars and 2 user customizable orifice bars

### MT4200-100: Single stage pneumatic firing cold gas system

- Includes 1 auxiliary charge tanks: 0.75 liter
- Includes 1 fixed size orifice bar

## Input/ Output Connections

- Gas output port: 1.625 inch 12 tpi O-Ring Boss Seal (Also known as SAE-20)
- Gas charge port: S/JIC male (1/4 " tube, thread 7/16-20)
- Trigger input: BNC. Requires non-powered contact closure
- Trigger output: BNC. NPN style contact closure  
Quantity 2  
 $I_{max} = 50$  mA,  $V_{max} = 70$  V
- Pressure ports: SAE #4 O-Ring Boss Seal  
Quantity 4 per stage 2 are located before orifice and 2 are located after orifice to allow mass-flow calculations

## Physical Information

- Hydrostatic test pressure: 150% max working pressure
- Upgradeability: Single Stage Electronic Firing to Dual Stage
- Service interval: 5 000 cycles
- Compressed air: 120 psi (8.3 bar, 830 kPa)
- Operating temperature: 18~30C, 35~85% RH
- Power requirements: 100~240VAC, 50/60 Hz, 250 W
- Dimensions: 1 048 mm x 963 x 984 mm (L x W x H)  
With largest aux. charge tank  
H = 1 342 mm
- Weight: 165 kg (single-stage electronic firing version)

## Options

- MT4717-028: 28.3L Inflator Test Tank
- MT4717-060: 60L Inflator Test Tank
- MT4300-001: SureFire Data Acquisition System
- MT4200-103: SureFire Integrated CGS Control
- MT9013-001: Installation
- MT9003-004: Training
- 200725-004 Orifice bar, 10.2 mm (0.4 inch)
- 200725-005 Orifice bar, 12.7 mm (0.5 inch)
- 200725-006 Orifice bar, 15.2 mm (0.6 inch)
- 200725-007 Orifice bar, 17.8 mm (0.7 inch)
- 200725-008 Orifice bar, 20.3 mm (0.8 inch)
- 200725-009 Orifice bar, Blank with pilot hole
- MT4811-095 Aux charge tank, 0.95 liter
- MT4811-190 Aux charge tank, 1.9 liter
- MT4811-380 Aux charge tank, 3.8 liter