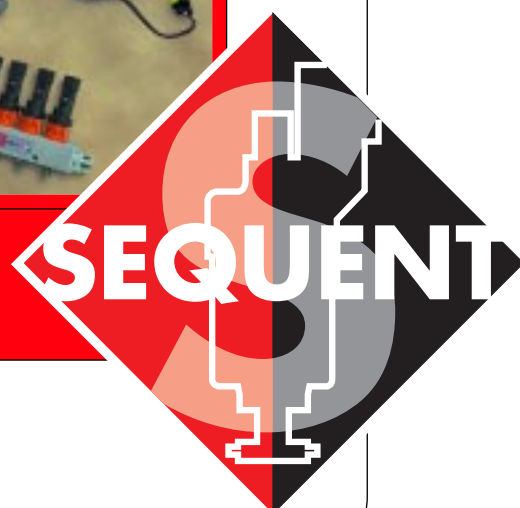




Multipoint sequential injection system with BRC electro-injector



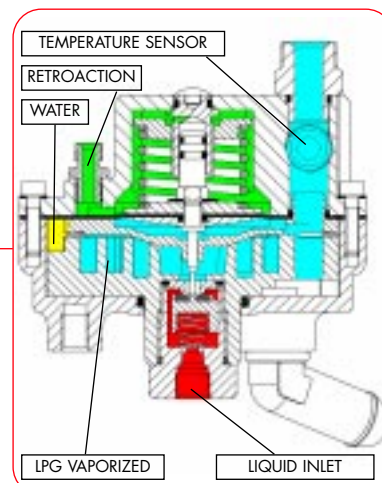
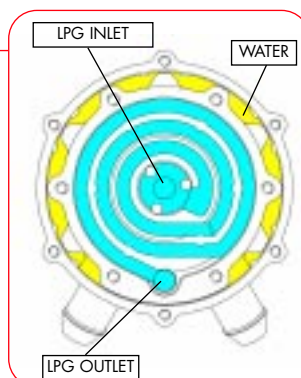
SEQUENT: BRC MULTIPOINT SEQUENTIAL INJECTION SYSTEM

FEATURES OF COMPONENTS

Sequent LPG GENIUS Reducer/Vaporizer



Diaphragm single-stage type
Set out pressure:
120 kPa or 150 kPa related to the air-intake manifold pressure
No bleeding needed
Max. capacity to feed with SEQUENT system: 140 kW
Regulation: R67-01



Electro-injector BRC "IN03"



BOTTOM FEED
Floating shutter during friction absence
Impedance: 2.04 Ω / 2.35 mH a 20 °C
Vibrations: 1,5 g between 50 Hz and 400 Hz
Temperature: -40 °C ÷ 120 °C
Voltage: 6 V ÷ 16 V
Tightness: Gomma su metallo
Noise: < 90 dB
Regulation: R67-01; R110

LPG feeding capacities

		Genius 800	Genius 1200	Genius 1500
Injectors Max Type	Aspirated	-	26 kW/cylinder	30 kW/cylinder
	Supercharged	-	32 kW/cylinder	36 kW/cylinder
Injectors Normal Type	Aspirated	17 kW/cylinder	21 kW/cylinder	-
	Supercharged	22 kW/cylinder	26 kW/cylinder	-

Values by way off example only.

CNG feeding capacities

		GeniusM 2000	GeniusM 2500
Injectors Max Type	Aspirated	20 kW/cylinder	23 kW/cylinder
	Supercharged	23 kW/cylinder	26 kW/cylinder
Injectors Normal Type	Aspirated	18 kW/cylinder	20 kW/cylinder
	Supercharged	20 kW/cylinder	23 kW/cylinder

Values by way off example only.

FLY SF electronic control unit

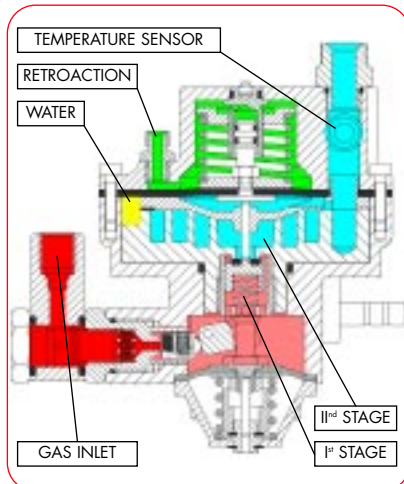


Microcontroller automotive 32 bit 20 MHz
Operating Temperature: -40 °C + 125 °C
Waterproof tightness for immersion
Observance of the automotive rules on protections and input/output signals
Operating voltage: 6.5 V ÷ 18 V
Sensors diagnosis and compatible actuators with EOBD
Communicates and it is re-programmable by PC through K line
Supports the communication protocol KWP2000
Supports CAN 2.0 communication
EMC compliant
Pilots : up to 4 injectors in the version with one connector
up to 8 injectors in the two connectors version
Integrated injectors cut-off
Integrated timing advance processor
R.P.M. signal reading also from crankshaft
Regulation: R67-01; R110

SEQUENT: BRC MULTIPOINT SEQUENTIAL INJECTION SYSTEM

FEATURES OF COMPONENTS

Thermostatic Valve
Diaphragm double-stage type
Set out pressure:
200 kPa or 250 kPa related to the air-intake manifold pressure
No bleeding needed
Max. capacity to feed with SEQUENT system: 140 kW
Regulation: R110



Sequent CNG GENIUS Reducer



FJ1 Gaseous Phase Filter



Cartridge filter
Load loss:
35 kPa with Q= 18000 NI/h (test fluid air)
Regulation: R67-01; R110

THE INTERFACE SOFTWARE

SEQUENT is a versatile system thanks to powerful interface software developed by BRC. By means of a portable PC, the software allows to communicate with the Fly SF ECU and reach all its functionalities.

FLY SF ECU Programming

The programming of the gas ECU necessary to obtain the correct working of the equipped vehicle is simple and quick when the configurations are already available from the BRC web-site, from local dealers or from previous installations made by installers. A simple and driven procedure instead allows developing independently the configurations for those cars which are still not available from other sources.

Setting up

The refinement of the configurations, the optimisation of the driving conditions and, when necessary, of the power, the adjustment of the maps available for different vehicles are open functions. Thanks to the above mentioned settings the installer has a direct access to many of the setting up parameters that allow to obtain excellent results even on the more difficult vehicles.

Diagnostic

Thanks to the diagnostic functions it is simple to verify the correct installation or find out the causes of malfunction. The ECU inspection on input and output faults and the consequent error message, the possibility to act actuators to verify the correct working, the alphanumerical and graphical monitoring of all data related to the system working make this interface software like an instrument able to simplify the complex things.

Offline/utility

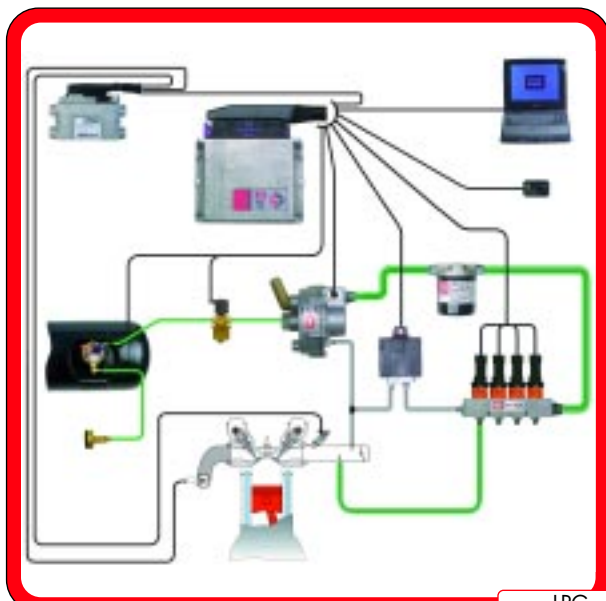
A series of functions, qualified even if disconnected from the Fly SF ECU, allows to check and manipulate data and configurations previously filed, organising like that an archive or preparing a subsequent work.



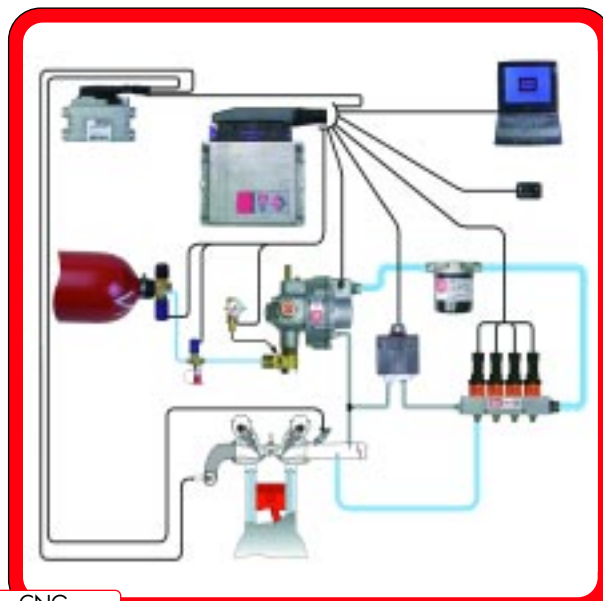
SEQUENT: BRC MULTIPOINT SEQUENTIAL INJECTION SYSTEM

THE PERFORMANCES OF THE SYSTEM

LPG and CNG, clean fuels and nowadays already available for automotive applications, with the sequential injection of **SEQUENT** allow levels of emissions which are lower then the current and future limits.



LPG

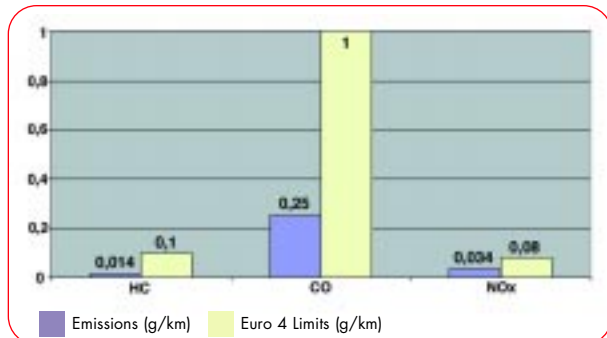


CNG

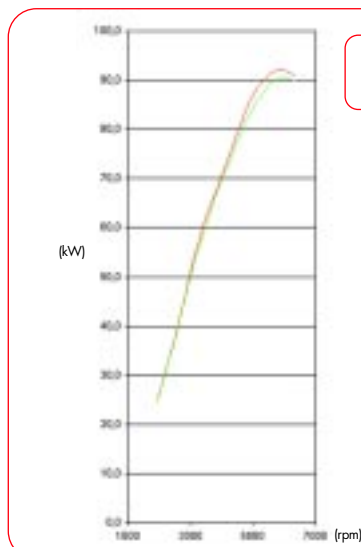
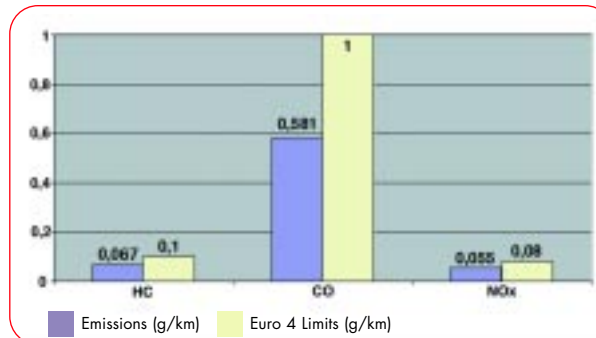
A system that guarantees all advantages of LPG or CNG feeding without worsening the original power of the engine is the aim achieved with **SEQUENT**.

The precise fuel dosage linked to the possibility to optimize spark advances, allows to obtain optimal performances.

Opel Zafira 1.8i Euro 4 LPG – Emissions cycle ECE-EUDC



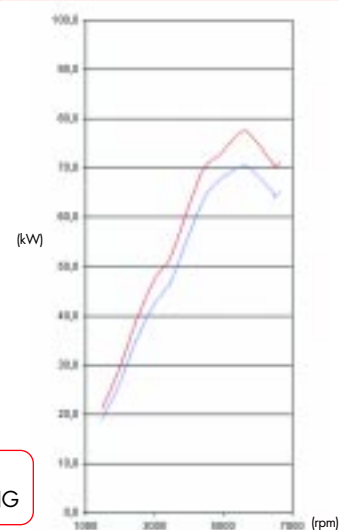
Ford Focus 1.8i Euro 4 CNG – Emissions cycle ECE-EUDC



Opel Zafira 1.8i Euro 4 LPG
Power Comparison Petrol – LPG

- Petrol power (kW)
- LPG power (kW)
- CNG power (kW)

Ford Focus 1.8i Euro 4 CNG
Power Comparison Petrol – CNG





Based on the M.T.M. Co.'s long experience in the designing and construction of LPG and CNG gaseous injection systems, the new multi-point sequential system constitutes the peak of the current technology in the field of the gaseous injection for running engines at a controlled ignition.

The system is the result of the M.T.M. Co.'s engagement to meet the technological requirements of the current and future generations of vehicles, not only as to the mandatory emission standards, but also as to the diagnostic and the integration with the original system, according to the provisions of the modern norms on the EOBD.

The M.T.M. Co.'s response is a system based on electro-injectors (tested following the standards of the car-makers) assuring the better integration, both electronically and for communication (through K serial line and CAN BUS), and in the mechanical and fluid dynamic context of the vehicle.

The system make-up

The BRC multipoint sequential injection system is based on components validated in the automotive field by carmakers, such as: the refuelling point, the tank, the pipes reaching the front of the vehicle, the gas cut-off solenoid valve, the reducer-vaporiser of the GENIUS type, the injectors, the rubber connection pipes, the gas/petrol changeover switch with gas level gauge, the gas pressure and temperature sensors and the MAP sensor, the gas level sensor;

and on innovative components conceived to assure and improve safety or to implement new functions, such as: the Europa multivalve, the Fly SF ECU, the injectors rail.

Functions

The control of the fuel-air mixture titer is assured by the original petrol ECU while running on gas too (system of the series type); the gaseous injection system is only aimed at turning the control sent from the petrol ECU to the injectors into an equivalent control to the gas injectors. The whole diagnostic performed by the petrol ECU is this way preserved and kept on working while running on gas too (apart from the control of the petrol injectors that are excluded while running on gas), assuring the OBD compatibility.

The petrol injection times-gas injection times translation is carried out through predictive algorithms enabling the gas injection in every cylinder during the petrol injection on the corresponding injector.

The Fly SF ECU measures the gas pressure that feeds the injectors and rectifies the gas injection times depending on the value read, it makes practically the gas quantity injected independent compared with the small pressure variations.

The series operation of the system assures and preserves the strategies used by the carmaker, as the management of the

out-of-revs and of the cut-off in tip-out, the drive control, the cut-off of injectors on the cylinders where the missed ignitions are spotted, and the control of carburetion during the drain phase of the can.

The petrol injection times-gas injection times translation maps are functions of the engine r.p.m. and of the manifold absolute pressure (MAP) and are automatically varied by a self-adaptative strategy that pursues the possible wear and tear of both systems. We assure this way that the gas system behaviour repeats, in very instant of the system life, the behaviour of the specific vehicle being equipped.

The OBD compatibility is assured by the system working principle of the series type and by the sophisticated diagnostic of the sensors and of the actuators carried out by the gas ECU. In the event of failure of an original component of the vehicle, the petrol ECU will be able to regularly diagnose it, whereas, in the event of failure of a component of the gas equipment, the gas ECU, after having positioned it, could immediately change over to petrol assuring the integrity of the catalytic converter and the maintenance of the polluting levels and preserving the engine and the other members from any damages.

The vehicle will be therefore always able to run in observance of the OBD norms. Therefore the vehicle will be always able to work respecting the OBD rules.

The automatic changing over to petrol could be immediately indicated to the driver, through a buzzer and special optical signals.

The automatic changing over to petrol can also occur in lack of gas, it is particularly comfortable and safe for the user who can keep on driving undisturbed, without having to act on the changeover switch.

Also the changeover from a fuel to another is in sequential way. By following a patented strategy, the Fly SF ECU is able to act the changeover on each cylinder one at a time, making so unnoticed the change from a condition to the other in every driving condition.

It has been paid particular attention, in order to obtain an advanced gas feeding system with the maximum technological knowledge, but in the meantime versatile and easy to use. For this reason SEQUENT is a "open" system, usable both on vehicles developed by BRC, and on those vehicles directly developed by installers duly trained.

In the point of view to assure a rugged and reliable system, all the protections and precautions asked to BRC by the car-makers have been taken (filters, waterproof connections, protections from installation mistakes, etc...).

The sequential injection of SEQUENT allows to obtain excellent results for what concerns polluting emissions, always assuring the performances and a very good driving level.

The capacities to feed are over 30 kW per injector, being able to pilot up to 8 injectors, 240 kW in all corresponding to 326 HP; vehicles provided with aspirated or supercharged engines can be installed indifferently.





Modular Common Rail System for Gas



MTM s.r.l.

Via La Morra, 1 - 12062 Cherasco (Cn) - Italy
Tel. +39 0172 48681 - Fax +39 0172 488237
<http://www.brc.it> • E-mail: info@brc.it