

# ***New products***

**STAG**<sup>®</sup>  
autogas systems

**GENERATION**



### **Market leader**

AC SA is a Polish leader and also an important world's manufacturer of automotive STAG brand LPG/CNG systems.

Highlights of AC SA:

- » employment: 500 regular staff, almost 600 in busy seasons
- » internal research and development centre
- » manufacturing space of 13,000 sq. m.
- » modern plant and equipment
- » extensive distribution network in Poland and abroad
- » co-operation with more than 1,000 service shops across Poland
- » internal network of STAG Partner Service Points

### **Warsaw stock exchange**

On August 11 2011, the company made a successful debut on the Warsaw Stock Exchange.

**/// Nearly three million drivers in the world save money and the environment through safe and reliable systems LPG/CNG, produced by AC S.A. Every minute, in 40 countries of the world, comes another car with our electronics. ///**



## **Research and Development Centre**

The unquestioned leader in alternative fuel supply technologies for mechanical vehicles is a consequence of the synergy of long-term experience and professional knowledge of the staff. The Research and Development Centre of AC S.A. has been established to strengthen this interaction. The idea and driving force behind all these activities is our deep conviction that only innovative products that meet the most stringent regulations of the automotive industry are capable of meeting the market expectations not only now, but also in further years.

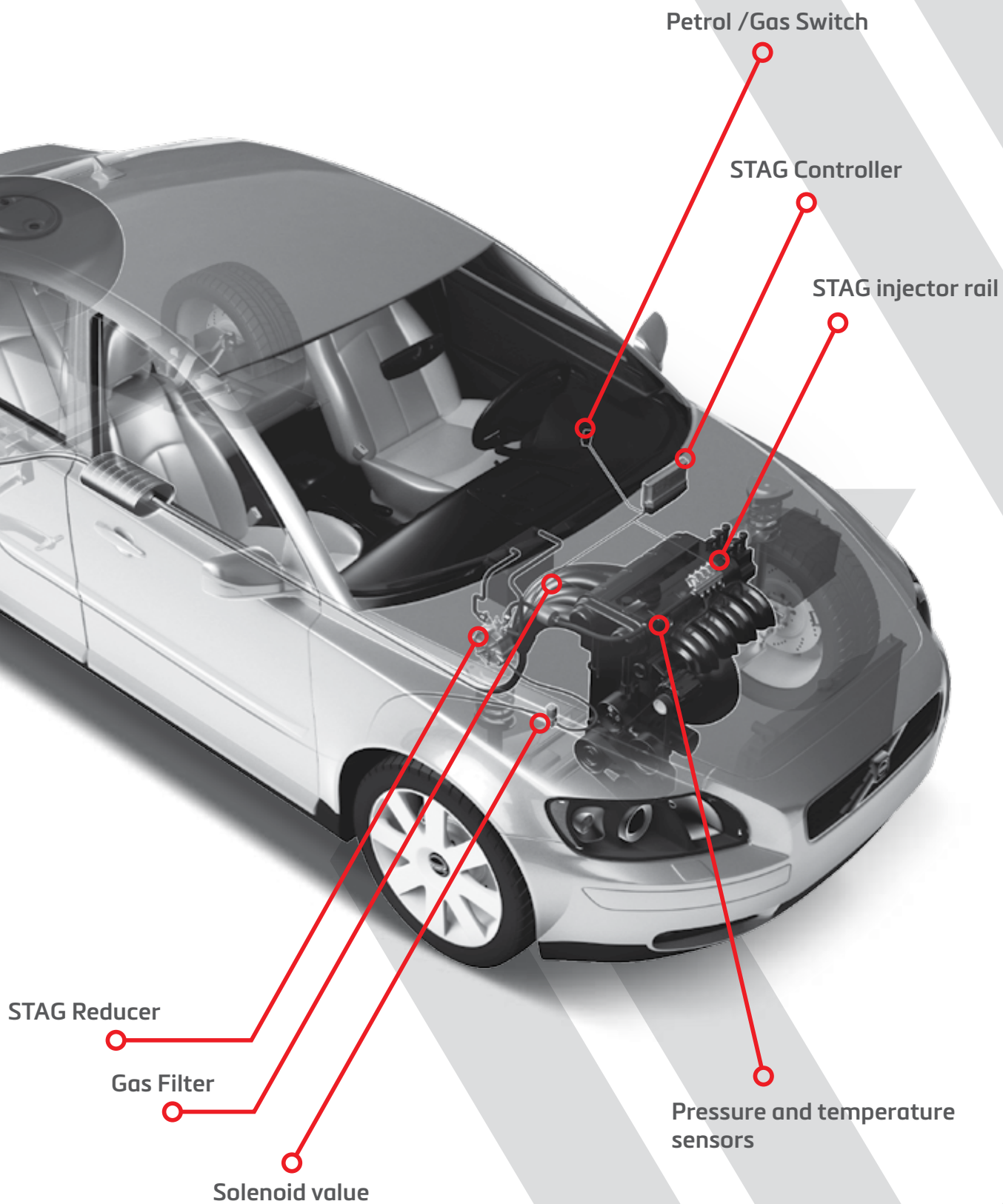
### **Research and Development Centre facilities:**

- » dedicated building with the area of 2,000 sq. m.
- » 7 laboratories and 7 technical departments equipped with specialised devices
- » workshop stations for research and development works and testing vehicles with combustion engines, including: gasoline, hybrid, Diesel, and gasoline direct injection units
- » chassis dynamometer and engine test stands
- » LPG filling station and one of the few CNG filling stations in Poland with tanks for technological purposes





## Elements of a STAG gas installation



# Q GENERATION

**Q-generation** - this group of controllers (QBOX, QMAX, QNEXT) created by leading specialists of the STAG brand. The controllers share the same functionality, but differ methods of installation and engine power to which they are dedicated.

**Q-generation** meets the requirements of automotive and mechanics, offers a wide range of technology and technical means. The installer can make a choice between installation of QBOX or QNEXT independently and the owners of „large“ cars can count on proven technologies and high performance of QMAX.



**QMAX**



**QNEXT**



**QBOX**

	GOFAST	Q-GENERATION			
	GOFAST	QBOX BASIC	QBOX PLUS	QBOX NEXT	QMAX PLUS
Reminder about the planned gas system service check	■	■	■		
Preview of working parameters on the oscilloscope	■	■	■	■	■
Petrol injection time map 2D	■	■	■	■	■
Petrol injection time map 3D		■	■	■	■
Operating mode – CNG fueling	■	■	■	■	■
Engine rpm signal filter	■	■	■	■	■
Operation with various types of injection control (standard, doubling)	■	■	■	■	■
Setting the maximum engine load on the gas	■	■	■	■	■
Engine type, standard or turbocharged	■	■	■	■	■
Mazda Leaning™	■	■	■	■	■
Post-injection cut-out threshold	■	■	■	■	■
Integrated corrections for gas temperature and pressure	■	■	■	■	■
Gas injectors heating	■	■	■	■	■
Map of correction based on gas temperature	■	■	■	■	■
Reducer pressure reduction upon cut-off (discharge)	■	■	■	■	■
Possibility to use the signal from camshaft position sensor to determine the engine rotation		■	■	■	■
Setting of the allowed number of emergency starts	■	■	■	■	■
Sound alarm for emergency start	■	■	■	■	■
Support of two lambda voltage simultaneously		■	■	■	■
Wideband oxygen sensor support		■	■	■	■
RENIX type injectors support		■	■	■	■
Hot start	■	■	■	■	■
Map of correction based on gas pressure		■	■	■	■
Automatic setting of gas level	■	■	■	■	■
Leaning on cold engine" option – limiting the maximum injection time on a cold engine (VAG)	■	■	■	■	■
Detection of gas pressure sensor fault	■	■	■	■	■
Auto-calibration – "all injectors together" option	■	■	■	■	■
Intelligent Autocorrection System ISA3 (automatic correction based on petrol injection times)			■	■	■

	GOFAST	Q-GENERATION			
	GOFAST	QBOX BASIC	QBOX PLUS	QNEXT PLUS	QMAX PLUS
Coupling with interface OBD (CAN)			■	■	■
Coupling with interface OBD (K-LINE)			■	■	■
Intelligent Autocorrection System ISA 3 (adaptation based on short and long-term corrections STFT and LTFT)			■	■	■
Monitor of OBD parameters			■	■	■
Reader of OBD parameters			■	■	■
Support of invert corrections OBD			■	■	■
Switch LED-300; LED-300/400B (LED-300/401B)		■			
Switch LED-400 (LED-401)			■	■	■
Support of wideband oxygen sensor and voltage lambda simultaneously		■	■	■	■
Map of correction based on reducer temperature		■	■	■	■
Freeze frames for controller faults		■	■	■	■
Test of the LED	■	■	■	■	■
Possibility to choose the switch type (Led300, Led300/400) - Switch visualization in the diagnostic application		■	■	■	■
Information on the vehicle and gas system	■	■	■	■	■
Petrol ratio (petrol adding)		■	■	■	■
Automatic adjustment of the multiplier	■	■	■	■	■
Intelligent support of extra-injection - this function eliminates need of Mazda Leaning function, which is known in STAG300 controller	■	■	■	■	■
Reading of rpm based on petrol injection pulsing	■	■	■	■	■
Detection of missing or overloaded solenoid valve	■	■	■	■	■
Test of actuating devices: injectors, solenoid, buzzer	■	■	■	■	■
Option for changing injection sequence	■	■	■	■	■
Possibility to block the work on gas when it's time for inspection		■	■	■	■
Correction of injector flow	■	■	■	■	■
Correction of the opening time of injectors	■	■	■	■	■
The ignition signal from petrol injection pulses	■				
Overlap when switching fuel of petrol/gas		■	■	■	■
Temperature reading of emulated engine		■	■	■	■
The "continuous error signal"		■	■	■	■
Sound signaling informing about the forthcoming review	■	■	■	■	■
Operating time counter on the gas and gasoline since the last application connection		■	■	■	■
Setting "turn off solenoid" (useful when the module is connected TAP)		■	■	■	■



**/// Qbox Plus and Qmax PLUS are technologically advanced controllers, with extensive functionality, providing the ability to tune the perfect LPG installation in virtually any vehicle. ///**



## STAG QBOX PLUS

### Controller

- » Intended for vehicles with 4-cylinder engines
- » Straight connector – 48 pin



## STAG QNEXT PLUS

### Controller

- » Intended for vehicles with 4-cylinder engines
- » Straight connector – 48 pin



### Common features

- » Auto-adaptation OBD
- » Innovative auto-adaptation ISA 3
- » Support for CAN and K-LINE according with OBD2/EOBD
- » Extended options for reading OBD with auto error canceller
- » Overlap when switching fuel
- » Built-in fuel level emulator FLE-FC and FLE-JC



### Auto-adaptation OBD

Auto-adaptation OBD guarantees gas injection, exactly suited to the operating conditions and engine load. Influence on the composition of the mixture not only has information about the time of injection of gasoline, but also the modification in accordance with correction current gasoline unit.

### The innovative system auto-adaptation ISA3

ISA 3 is an innovative approach to the auto-adaptation, which should be done after the actual time of gasoline injection with some parameters OBD.

### Automatic OBD error canceller

Automatic OBD error canceller provides deletion of selected malfunctions OBD, without the need of connecting external devices.



**Power and speed! QMAX PLUS is a continuation of a proven and respected STAG QBOX PLUS, designed specifically for high power engines with indirect fuel injection.**



## STAG QMAX PLUS

### Controller

- » Auto-adaptation OBD
- » Innovative auto-adaptation ISA 3
- » Support for CAN and K-LINE according with OBD2/EOBD
- » Extended options for reading OBD with auto error canceller
- » Overlap when switching fuel
- » Built-in fuel level emulator FLE-FC and FLE-JC
- » It is intended for vehicles with 5-8 cylinder engines
- » Built-in emulator pressure level
- » Angle connector- 90 pin



#### Auto-adaptation OBD

Auto-adaptation OBD guarantees gas injection, exactly suited to the operating conditions and engine load. Influence on the composition of the mixture not only has information about the time of injection of gasoline, but also the modification in accordance with correction current gasoline unit.

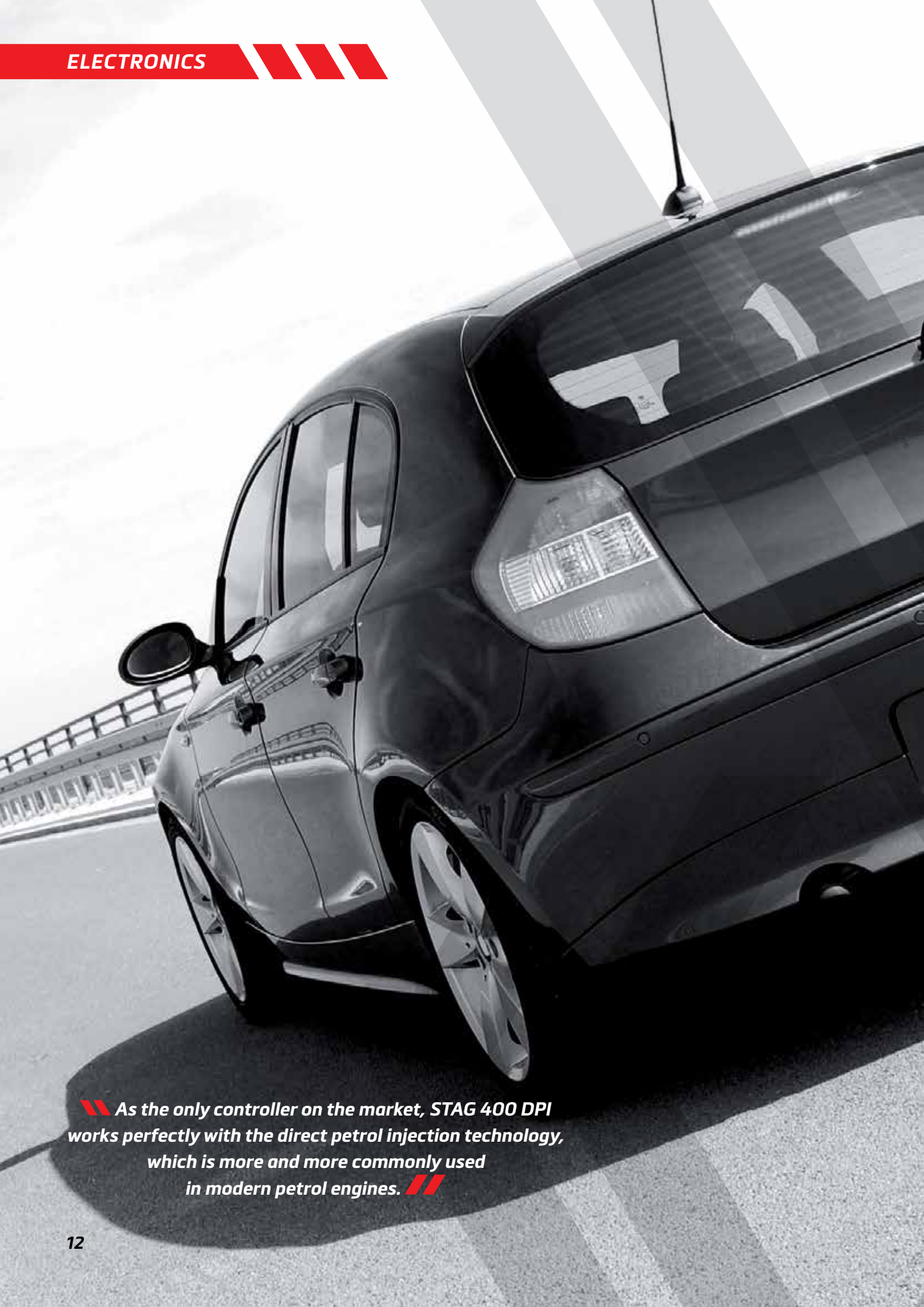
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**As the only controller on the market, STAG 400 DPI works perfectly with the direct petrol injection technology, which is more and more commonly used in modern petrol engines.**





## STAG 400 DPI

### Controller

STAG 400 DPI is produced based on the latest technology and top-quality electronic components and is equipped with innovative software featuring a number of functions, which makes STAG 400 DPI the most advanced and best for the direct petrol injections engines today.

- » Precise gas dosage in the full RPM range with optimized extra petrol injection
- » Maintains the key petrol engine operating parameters
- » Innovative gas dosage method to ensure stable engine operation
- » Seamless petrol to gas switchover
- » Diagram of connection and calibration similar to that in other STAG controllers
- » New tools for quick calibration
- » Supremely precise auto-calibration
- » Built-in OBDII/EOBD adapter
- » Extended auto-diagnosis system
- » Integrated petrol pressure emulator
- » 3D graphic map
- » Extra injection management readout of ECU correction
- » Monitoring of working parameters on an oscilloscope
- » Clear calibration program

**Universal engine code for 4-cyl. VAG group vehicles (engine size 1.6 and higher, production year 2011 and older)**

Universal code dedicated to service VAG group 4-cyl. vehicles with 1.6 liter engines and higher and produced up to 2011. Product premiere in April, 2015.



**STAG Diesel is an alternative fuelling system  
for 2-16 cylinder Diesel engines.**



## STAG DIESEL

### Controller

An advanced algorithm of sequential injection and the innovative system of auto-adaptation ensures the correct fuel ratios within the entire working range of the engine, therefore, the user can quickly observe significant economic benefits.

- » Operation with Diesel engines up to 8 cylinders in a sequential mode
- » Operation with Diesel engines up to 16 cylinders in a full group mode
- » LPG or CNG post injection option
- » Advanced algorithm for sequential gas injection
- » Precise gas fuel dosing based on the current engine demand, accurate measurement of the volume of Diesel directly from the injectors ensures maximum savings

- » Measurement and control of the amount of injected Diesel in vehicles with common rail engines
- » Extended algorithm for engine protection
- » Controlled exhaust gas temperature for improved safety of the drive unit
- » Use of the readings of a wide-band oxygen sensor, control of air-to-fuel rate with an independent Wide-band oxygen sensor dedicated to Diesel engines (optional installation for engines without factory-mounted sensors)
- » Support for cars provided with cruise control
- » Support for electronic Petrol/Gas switch type LED401
- » Auto-calibration system
- » Ability to maintain power after conversion in vehicles with common rail engines



**/// Stag200 GoFast - compact housing combined with easy installation. ///**





## STAG GOFAST

### Controller

GoFast is a versatile controller designed for installation in most cars (sequential, semi-sequential, "full group"). The device has been designed as simple as possible the entire system, and a significant shortening of the time needed for installation and calibration of the system.

- » Fast installation due to the minimal number of wires
- » Simple and clear calibration program - only two dialog window
- » Processor has the ability to expand with new software features
- » Application sessions without the controller in use demo mode
- » Small - compact weather - resistant housing
- » A switch with an integrated buzzer – only 3 wires are required for connection





## ISE-D4

### *Injection signal emulator*

The unique fuel injector emulator ISE-D4 is dedicated to be used with the STAG 400 DPI controller in Toyota brand vehicles with the D4 direct injected engine.



## FPE-A

### *Fuel pressure emulator*

Essential for use in cars generating fault codes associated with the fuel pressure while the engine is running LPG/CNG. FPE-A model is equipped with an automatic setting signals, giving enhanced use of other new car models, such as: Opel Astra IV, Opel Insignia, Chevrolet Captiva, Volvo S40, S60, S60R, S80, XC70, XC90.



## FLE-JC

### *Fuel level emulator*

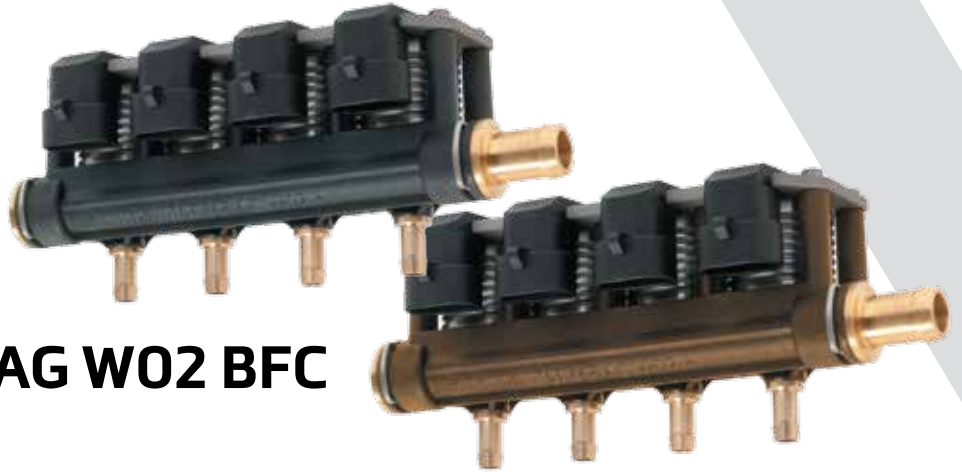
Fuel Level Emulator in the cylinder FLE-JC is intended for use in cars (especially in Japan) in which the resistance of the floater is in the range of  $10\Omega$  -  $550\Omega$ , the ECU calculates the amount of fuel consumed based on the fuel injection time and the number of kilometers.



## LED-500

### *Touch switch petrol / gas*

- » Touch switch panel
- » Built-in buzzer
- » Indication of the current level of gas in the tank
- » Auto dimming function of the switchThe ability to adjust the volume
- » The ability to run on natural gas in an emergency
- » The ability to expand the functionality of the control unit by adding software functions
- » Warning LED indicator of failure or malfunction of the system



## STAG W02 STAG W02 BFC

### Injection rail

AC W02 has been designed for LPG and CNG injection systems in all engines, including turbocharged ones. The four-section AC W02 injector offers excellent performance and a standardized range of applications with other products of AC S.A.

AC W02, flow rate of 120 l / min - up to 40 Hp per cylinder  
 AC W02 BFC, flow rate of 150 l / min - up to 50 Hp per cylinder

Very good and stable injection parameters (shutter ~2.0 ms, closing time ~1.0 ms)

- » A body of plastic composite material resistant to the adverse effects of gas
- » Innovative heat dissipation through the use of coil housing in the form of heat sink
- » Modern and refined, design for outstanding performance
- » Easy installation due to the small size and weight

- » Interchangeability of use in AC installation W02 W01 with the previous version, as well as competing products
- » The ability to apply to LPG and CNG installations, in all cars regardless of engine power, including turbocharged
- » Can be mounted directly on the manifold - in the form of 3-, 2- and 1-section of the injector
- » Power supply from any direction - interchangeability places a plug and the power nozzle
- » Can be inserted on either side of the sensor PS-04, which also can be rotated 360°, even after installing it in the machine
- » Increased stability limits of 100 thousand km on the urban cycle, or 200 thousand km in the extra-urban cycle

## STAG AC W03

### Injection rail

1-section injector provides superior performance, the ability to direct installation at the intake manifold and the unification of the use of other products manufactured by AC SA Undeniable advantage is the fact that the individual sections can be combined in a 2.3 or even 4 sections giving endless possibilities of injection assembly. STAG AC W03 injector is designed for installation of gas injection LPG and CNG vehicles in all engines, including turbo

- » Stable and precise injection parameters: Shutter ~2.0 s, the time of the closure of ~1.0 s
- » Quick and easy mounting directly on the intake manifold
- » Modern and refined, design that gives outstanding performance durability
- » High durability
- » Innovative heat dissipation through the use of coil housing in the form of a heat sink
- » Swivel joint available in a straight and angle version, a design making mounting easier





## STAG R02 TWIN

### Reducer

LPG reducer designed for cars with a capacity of max. 280Hp (206kW). The device was made on the basis of two reducers STAG R02. Reducer is characterized by high pressure and thermal stability while maintaining a compact size.



- » The pressure control within 0.9 – 1.4 bar
- » Supports power up to 280 Hp (206 kW)
- » The pressure drops when the power is needed up to 20%
- » One entry fi8 diameter gas
- » The two gas output fi12 (such as R02)

## STAG R14 CNG

### Reducer

AC R14 is dedicated for vehicles equipped with the CNG sequential injection. Note the fact that high gas pressure is reduced to low levels before entering into the regulator, which ensures a high level of stability



- » Low pressure drop at high loads
- » Minimal effect on the level of performance pressure when CNG tank is full
- » High-performance thermal
- » Stable control
- » Low pressure cut-off
- » Compact design
- » Small footprint



## PS-04

### Pressure sensor

The device has a simple and compact design that allows for quick and easy installation.

PS-04 design provides a universal and versatile replacement for PS-01 and PS-02.

- » Under pressure connection integrated with the monolithic body to eliminate the risk of leaks and improve resistance
- » Compatibility of PS-04 with the previous versions of PS, as well as competitive products designed for LPG and CNG injection systems in all engines in spite of power, including turbocharged ones
- » Easy installation due to reduced dimensions and compact construction
- » Multiple configuration options, fitting locations and mounting positions
- » Use of modern, high-quality sensors and electronic components ensuring the fast and precise transfer of information to the controller
- » Possibility to position PS-04 on any side of the WO2 injector, which can be additionally turned by 360° Even after it has been installed on the injector
- » Low inertia of response to gas temperature variations



## Settling filter GF01

Filter of volatile phase of LPG and CNG. ECE 67 R and 110 R. The device is equipped with a replaceable filter cartridge with the possibility of separation of solids and oil fractions. You can insert a pressure sensor and temperature of the gas (PS04). Another advantage is the possibility of rotating nozzles performed at 90°, 130°. Replacing the filter is very simple and consists of unscrewing the bottom of the cup without having to remove the gas pipe at the top of the filter.



## STAG R01 CS

### Reducer preheater

STAG R01 CS is a microprocessor-controlled electrical unit designed for preheating R01 reducers manufactured by AC S.A. The purpose of the electrical preheating of the reducer block is to enable switching to LPG earlier. The solution has been designed for engines with 4 up to 8 cylinders.

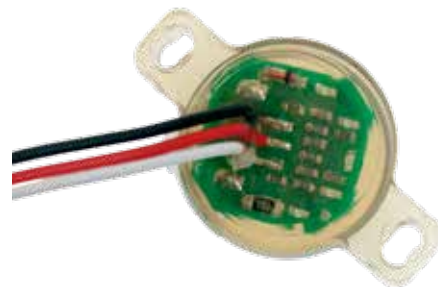
- » Ensures switching to gas earlier
- » Optimized management of the heating element by the control unit
- » Ensures the correct operating temperature of the reducer even at step changes in unit load
- » Minimizes energy consumption to protect the electrical system of the vehicle
- » The controller monitors the correct rise in temperature of the reducer to the required level, and prevents the reducer from cooling when needed
- » An installed STAG R01 CS does not require configuration – automatic adjustments to the engine
- » Ensures optimum operating conditions of the autogas system and safety of use

## WPGH Waterproof

### Indicator of gas level

Non-contact (Hall sensor) gas level indicator with a linear voltage output. The voltage in the absence of gas - 0V, the tank full - 5V.

The indicator is a monolithic structure consisting of a printed circuit board with led three wires, surrounded by a flexible, transparent amber body. The housing provides complete water resistance and remains flexible at temperatures ranging from -40 to 120 ° C.





## STAG TAP-03

*Timing advance processor*

The STAG TAP-03 processor for the advancing timing angles has been designed for vehicles powered by LPG/CNG as an auxiliary device to improve the efficiency of firing the fuel-air mixture by forcing the advance timing angle to change.

The device is available in two versions:

**STAG TAP-03/1** – has been designed for engines with an inductive crankshaft position sensor and up to 2 electronic camshaft position sensors.

**STAG TAP-03/2** – has been designed for engines with a digital crankshaft position sensor and up to 2 electronic camshaft position sensors.

STAG TAP-03 features and reporting system auto-calibration waveforms, which offers unlimited opportunities to work in different systems.



## STAG AFR

*Air to fuel ratio controller*

The STAG AFR controller for wideband oxygen sensors has been designed to determine the air to fuel ratio (AFR) for an internal combustion engine, based on the measurement of oxygen in the exhaust gas. The STAG AFR controller for wideband oxygen sensors allows fine-tuning of, the engine operation curves, or autogas systems, so that the AFR ratio is kept at an optimum level to ensure the maximum engine power at normal fuel consumption.

- » Adjustment of the fuel system of carburetor and injection based fueling systems
- » Calibration of autogas systems in any generation available on the market
- » Diagnostics of fuel systems

- » Diagnostics of factory-mounted oxygen sensors
- » Calibration of chip-tuning systems
- » A 0-5V analog output, and 0.1V-0.9V to control or analysis by an external device (chassis dyno, Drivers and piggyback standalone type)
- » Dedicated Mobile Application for Android



## Bluetooth Next

### Interface

The device has been designed for trouble-free, short-range communication between a STAG gas injection controller and a PC with a Bluetooth module installed. Bluetooth Next is equipped with the latest radio communication module ensuring an excellent connection to the controller, and particularly trouble-free communication with controllers based on the new STAG platform (GoFast, QBox Basic and QBox Plus) and other news such as STAG TUNING and STAG AFR. Recommended for communication with our engines with mobile applications.



## STAG TUNING

### Chiptuning

Chiptuning as a module, improves the engines efficiency and increases power in the full RPM range. As a result, we obtained a safe increase in power and, what is more important torque increases up to 20%, resulting in an improvement of engine's flexibility starting at 1500 rpm. The vehicle becomes more dynamic, without increasing fuel consumption. "STAG TUNING" is very simple - just connect two connectors. No special knowledge or intervention in a vehicles computer is required. It's a completely safe, independent module used in charged engines.



- » Increase flexibility and efficiency in all gears at all speeds
- » Minimize the effect of the so-called „turbo lag“
- » The possibility of individual characteristics of power waveform and torque

# STAG mobile

Autogas calibration is available for everyone!



## STAG MOBILE

*Mobile Application*

The STAG MOBILE is the convenience and ease of access to the full AC STAG software on the phone or tablet. The application supports drivers in the family STAG Qbox, it gradually expanded and in the future will be compatible with the rest of the Q-generation drivers.

Latest application is not only a calibration software STAG-a, but the extra touches for the driver in the form of current control parameters of the gas system and OBD reader function enables parameter display board diagnostic interface. Just Scanner OBD2 / EOBD on your phone!



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