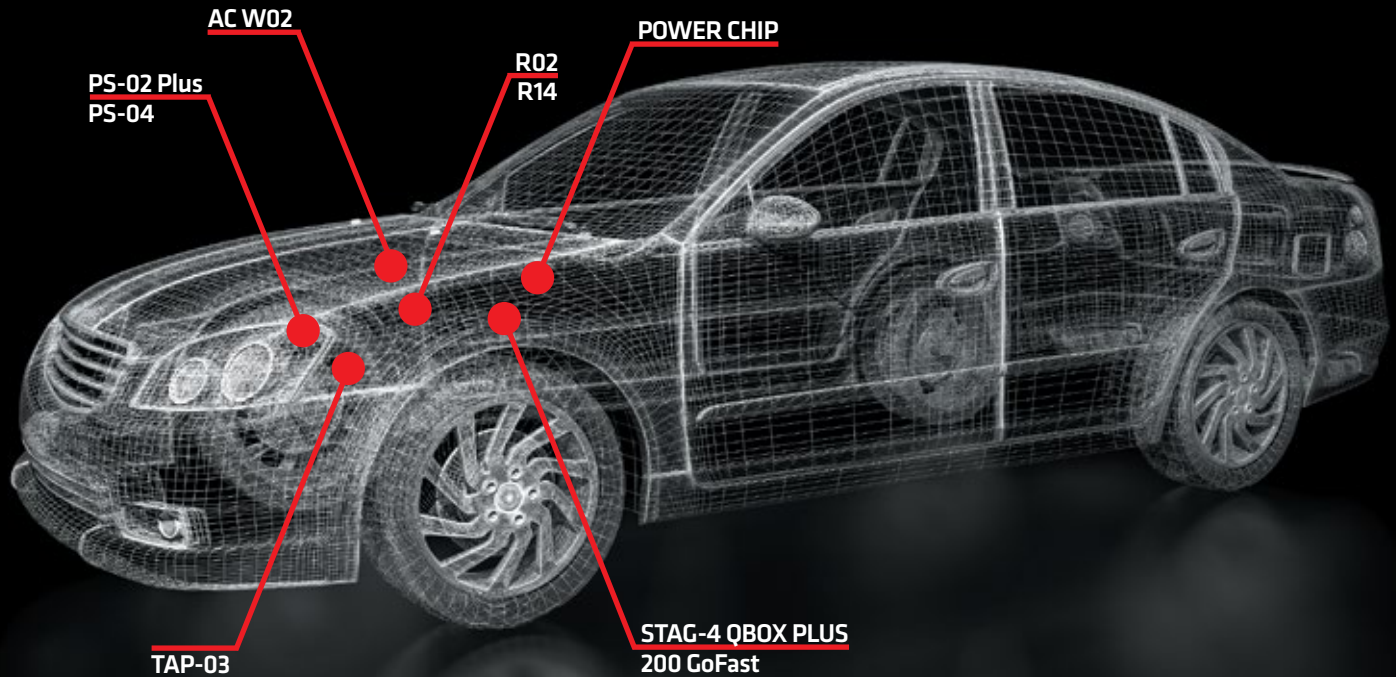


new products 2014



STAG
autogas systems

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AC S.A. reserves the right to introduce changes to the presented information. All information is current as of the date of print.
As provided by the program of continuous improvement at AC S.A., the information is subject to modification without notice.

200 GoFast



The key idea of the controller is an intuitive system focused on fast and easy installation, where the number of on-board functions meets the needs of most cars. The versatility of the controller is also emphasized by the number of supported vehicle groups operated in sequential, semi-sequential or full group modes.

Functionality:

- new hardware platform based on a 32-bit processor,
- optional extension with new application functions,
- new, intuitive PC application with a clear display of parameters and simple calibration,
- application sessions without the controller in use (demo mode),
- a switch with an integrated buzzer and simplified installation method – only 3 wires are required for connection,
- new compact housing made of plastic and working at $-40 \dots +140^{\circ}\text{C}$, resistant to moisture.

STAG 200 GoFast does not require connection to the ignition switch, what makes installation much shorter. There are also improvements related to rpm calculation based on injection times – there is no need to connect the wire with rpm signal. Connection of the switch has also become simple, as it includes only three installation wires.

Easy calibration:

- all functions are arranged on two panels and no tab switching is required,
- on-board oscilloscope functionality,
- if the PC communication cable has been disconnected, the controller attempts to restore the transmission itself.

Application functions:

- Reminder about the planned gas system service check
- Preview of working parameters on the oscilloscope
- Petrol injection time map 2D
- Operating mode – CNG fueling
- Engine rpm signal filter
- Operation with various types of injection control (standard, doubling)
- Engine type, standard or turbocharged
- Mazda Leaning™ - (we call it intelligent post-injection)
- 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)
- Setting of the allowed number of emergency starts
- Sound alarm for emergency start
- 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
- Map of correction based on reducer temperature
- Freeze frames for controller faults
- Switch visualization in the diagnostic application
- Information on the vehicle and gas system
- Petrol ratio (petrol adding)
- Automatic adjustment of the multiplier
- 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
- Valvetronic, start&stop, multi-air options

STAG-4 QBOX PLUS



STAG-4 QBOX PLUS controller for sequential autogas injection has been designed for vehicles with 4-cylinder engines with indirect injection. The unit is provided with all the functions of the proven controllers of STAG-4 and STAG-300 lines, what guarantees versatility and high quality. The new controller is equipped with an integrated OBD adapter and an optimized auto-adaptation assistant (ISA2).

Improved self-adaptation based on ISA2 ensures the following:

- dedicated ISA2 correction map independent of the rpm correction for injection times,
- precise acquisition of the reference petrol injection timing map at 1 kPa accuracy, with allowance for engine warm-up status,
- exact identification of open and closed loop modes for engine operation.

Additionally, it combines the traditional approach to gas dosage correction based on the reference petrol injection time map with the information acquired from the onboard OBD diagnostic systems so the control can be even more responsive to changes in mechanical components of the system and changes in the strategy of fuel dosing by the petrol ECU during system operation.

BENEFITS:

- new ISA2 self-adaptation assistant,
- integrated OBD adapter,
- support for CAN and K-LINE compliant with OBD2/EOBD,
- extended options for OBD* reading,
- connection to the LED 401 switch with 3 wires,
- modern design,
- hardware platform based on a 32-bit microprocessor dedicated for automotive solutions,
- wide range of operating temperatures allowed (-40°C +125°C).

*The extended OBD reading options enable the viewing of all parameters accessed through the onboard OBD2/EOBD diagnostic system (e.g. wide-band oxygen sensor, mass air flow sensor, short-term and long-term corrections, etc.), as well as reading and deleting any saved and pending faults.

AC W02-1



The single-section AC W02-1 gas injector offers excellent performance, direct installation at the intake manifold and a standardized range of applications with other products of AC S.A.

W02-1 has been designed for LPG and CNG injection systems in all engines, including turbocharged ones.

AC W02-1 ensures the following:

- stable and precise injection parameters: opening time ~2.0 s, closing time ~1.0 s,
- fast and easy installation directly at the intake manifold,
- modern and improved design to ensure excellent performance,
- high service life,
- innovative heat dissipation system with a radiator-shaped coil.

AC W02-1 works perfectly in spite of the driving style and engine load.

Advantages of W02-1 injectors:

- light construction resistant to the negative impact of gas,
- small dimensions making installation easier,
- high working parameters,
- fast response to changes in engine load,
- precise gas injection,
- stable operating parameters within the entire temperature and pressure range,
- use in any vehicle, including turbocharged engines;
- an elbow which can be turned 360° after installation,
- installation directly at the intake manifold,
- multiple configuration and setting options of a single injector,
- service life reaching 100k km in urban driving or 200k km in highway driving.

Design

W02-1 has been designed to ensure the best injection times under all conditions. Due to the use of specially selected materials, the injector is light and simple, what makes installation in the engine compartment easier and faster. The system of joining components allows multiple configurations. The unit is also prepared for the installation of the integrated gas temperature and pressure sensor PS-04 offering low inertia of response to gas temperature changes, which can be turned by 360°, even when installed on the injector. An elbow on the gas inlet which can be turned by 360° enables the installation of the injector even on the bottom surface of the intake manifold.



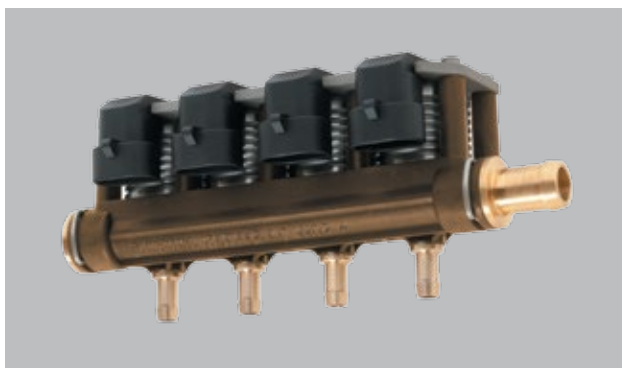
Technical specification of AC W02-1, flow 120 l/min:

Operating temperature [°C]	-20 do +120
Maximum working pressure [kPa]	400
Opening / closing time [s]	2,0 / 1,0
Dedicated nozzle diameters [mm]:	Ø 1,5; Ø 1,8; Ø 2,0; Ø 2,2; Ø 2,4 (reaming allowed)
Gas inlet fitting [mm]	Ø 6
Gas outlet fitting [mm]	Ø 6
Overall dimensions [mm]	47 x 60 x 28
Service life [km] - city driving mode: - highway driving mode:	100 k 200 k
Waga [g]	88

Standards and approvals:

W02-1 is compliant with the approval E8-67R-01 and UNECE Regulations.

AC W02-4



The four-section AC W02-4 injector offers excellent performance and a standardized range of applications with other products of AC S.A., both the new and older ones.

AC W02-4 has been designed for LPG and CNG injection systems in all engines, including turbocharged ones.

AC W02-4 ensures the following:

- very good and stable parameters of injection: opening time ~2.0 s, closing time ~1.0 s,
- fast and easy installation;
- modern and fine-tuned construction to ensure excellent performance;
- long service life thanks to the high quality of selected materials and innovative design.

AC W02-2 works perfectly in spite of the driving style and engine load.

Advantages of W02-4 injectors:

- plastic body, reduced weight and improved resistance to the negative effects of gas,
- easier installation due to reduced dimensions and weight,
- compatibility with the previous version of W01, as well as competitive products,
- designed for LPG and CNG injection systems in all engines with various power ratings, including turbocharged ones.
- innovative design solutions and improved materials ensuring excellent operating performance and body strength,
- test versions of the injector as 3-, 2- and 1-section units installed directly at the intake manifold, with the optional installation of PS-04 sensor on one of the injectors,
- switchable plug and feed connection (feeding on any side) and installation of PS-04 sensor (on any side) that can be turned by 360° even after it is installed on the injector,
- service life reaching 100 km in urban driving or 200 km in highway driving.

Compared to the previous version of AC W01 injector, AC W02-4 has been redesigned to ensure the best injection times in any conditions by the use of specially selected materials, as well as a light and simple construction which allows easier installation. AC W02-4 has been designed so that it can be easily used to replace W01 in the existing systems. Additionally, the system of connecting the components brings greater configuration. The structure also offers the installation of the integrated gas temperature and pressure sensor PS-04 with low inertia of the response to gas temperature changes on any side and with 360° turning functionality even when installed on the injector.

Benefits and design

W02-4 responds quickly to even minimum and transient load changes due to the excellent opening and closing characteristics. The minimum number of components and a plastic body make it light and simple.

Technical specification of AC W02-4, flow 120 l/min
(black body):

Operating temperature [°C]	-20 do +120
Maximum working pressure [kPa]	400
Opening / closing time [s]	2,0 / 1,0
Dedicated nozzle diameters [mm]:	Ø 1,5; Ø 1,8; Ø 2,0; Ø 2,2; Ø 2,4 (reaming allowed)
Gas inlet fitting [mm]	Ø 12
Gas outlet fitting [mm]	Ø 6
Overall dimensions [mm]	125 x 60 x 68
Service life [km]	
- city driving mode:	100 k
- highway driving mode:	200 k
Weight [g]	410

Technical specification of AC W02-4, flow 150 l/min
(light brown body):

Operating temperature [°C]	-20 do +120
Maximum working pressure [kPa]	400
Opening / closing time [s]	2,3 / 1,2
Dedicated nozzle diameters [mm]:	Ø 1,5 (reaming allowed); Ø 2,4; Ø 2,8; Ø 3,2
Gas inlet fitting [mm]	Ø 12
Gas outlet fitting [mm]	Ø 6
Overall dimensions [mm]	125 x 60 x 68
Service life [km]	
- city driving mode:	100 k
- highway driving mode:	200 k
Weight [g]	410

Standards and approvals:

W02-4 is compliant with the approval E8-67R-01 and UNECE Regulations.



AC R02 single-stage reducer designed for sequential injection autogas systems. It is used to reduce the pressure of liquid gas fed from the LPG cylinder and to transform it into a gas phase (vaporizing).

Its characteristics include small dimensions and unique design made of two aluminum castings and a hard plastic cover – not present in competitive reducers.

The high temperature efficiency and resistance to contaminations present in LPG, make it the best choice when selecting the components of LPG systems.

A new solution is the fitting, using only one central screw, which allows almost any mounting position. The versatility is enhanced by 120° and 90° elbows.

Stability is the word describing AC R02, as it not only provides constant pressure for the injection rail during driving, but is also fitter-friendly during the adjustments.

Functional description:

- Application: LPG reducer, single-stage, for sequential gas injection
- Design: two aluminum castings and a hard and resistant plastic cover
- Safety: compliant with Regulation R67
- Engine power: 120 HP
- Precision: pressure control within 0.9 – 1.5 bar
- Installation: gas inlet M10x1, gas outlet: hose Ø12, elbows Ø16



R02

Advantages:

- reduced pressure drops at high load,
- stable control,
- high temperature efficiency,
- high resistance to LPG contaminations,
- small dimensions,
- compact design.



AC R14 is designed for vehicles equipped with CNG (natural gas) sequential injection systems. This two-stage reducer with a solenoid valve ensures reduced pressure drops at high load and minimal effects of the CNG tank level on pressure efficiency. A significant feature of the new reducer is stable control and high temperature efficiency, which have a great impact on the functionality of the unit. It is also worth mentioning that the high pressure of gas is reduced to a low pressure level before entering the reducer, what improves safety.

An interesting feature is the compact design with small dimensions and a single mounting screw, which is a major advantage in the current tight engine chambers.

Functionality:

- two-stage reducer for sequential gas injection,
- body and cover made of two aluminum castings,
- construction compliant with Regulation R110,
- engine power 200 HP,
- precise pressure control within 1,4 – 2,2 bar,
- gas inlet M12x1,
- pressure gauge connection G1/4",
- gas outlet: hose Ø12,
- water outlets: hose Ø8,
- integrated solenoid valve –AMP Superseal connector (option without the valve),
- integrated filter for gas inlet.



R14

Advantages:

- reduced pressure drops at high load,
- high temperature efficiency,
- stable control,
- low cut-off pressure,
- compact design,
- small dimensions.

PS-02 PLUS



The integrated measuring unit PS-02 PLUS ensures exact measurement results for gas pressure, temperature and intake manifold underpressure.

PS-02 PLUS has been designed for LPG and CNG injection systems in any vehicle in spite of the engine power, including turbocharged ones. The unit measures gas pressure, manifold underpressure and gas temperature in the gas path. PS-02 PLUS guarantees precise measurement results in spite of the flow, temperature and pressure variations.

PS-02 PLUS ensures the following:

- precise measurements and no negative impact by temperature and pressure variations,
- tested installation method, already used for PS-02,
- proven and improved construction that guarantees tightness and resistance to damage.

PS-02 PLUS works perfectly in spite of the gas quality, driving style and vehicle load.

Advantages of PS-02 PLUS measurement units:

- reinforced body to reduce the risk of damage and leaks,
- easier installation due to reduced dimensions and weight,
- compatibility of PS-02 PLUS as a replacement of the previous version, PS-02, as well as competitive products,
- designed for LPG and CNG injection systems in all engines, in spite of power, including turbocharged ones.
- use of modern and high-quality sensors and electronic components ensuring the fast and precise transfer of information to the controller.

Compared to the previous version, PS-02, the reduced number of components used in PS-02 PLUS has allowed a modification that ensures tightness in any condition. This operation has made the unit smaller, lighter and simpler enabling easier installation. PS-02 PLUS has been improved so that it can be easily used to replace PS-02 in the existing systems. Additionally, compared to the previous version, modern, high-quality and precise sensors and other electronic components have been used.

Technical specification of PS-02 PLUS:

Operating temperature [°C]	-40 do +125
Working pressure [bar]	up to 6,75
Working underpressure [bar]	up to 2,00
Gas inlet and outlet in a T-piece [mm]	Ø 12
Underpressure T-piece [mm]	Ø 4 lub Ø 5
Overall dimensions [mm]	30 x 59 x 86
Weight [g]	45



Standards and approvals:

PS-02 PLUS is compliant with the approval E8-67R-01 and UNECE Regulation No. 67.



The integrated PS-04 measurement unit ensures the precise measurements of gas pressure, manifold underpressure and gas temperature.

PS-04 has been designed for LPG and CNG injection systems in any vehicle in spite of the engine power, including turbocharged ones. The unit measures gas pressure, manifold underpressure and gas temperature in the gas path. PS-04 guarantees precise measurement results regardless of the flow, temperature and pressure variations.

PS-04 ensures the following:

- precise measurements and no negative impact by temperature and pressure variations,
- low inertia of response to gas temperature variations,
- easy installation due to reduced dimensions and compact construction,
- possible integration with the injector and turning by 360°, even after fitting,
- simple and compact design to ensure tightness in any conditions.

PS-04 works perfectly regardless of the gas quality, driving style and engine load.

Advantages of PS-04 measurement units:

- 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 W02 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.

Compared to the previous versions of PS, PS-04 has been redesigned to ensure tightness in any condition by the reduction of components to a minimum. This has resulted in a simpler and more compact construction that enables fast and easy installation. PS-04 has been designed to provide versatility and compatibility so that it can easily replace PS-02 and PS-02 PLUS.

Construction of PS-04:

The unique construction, high-quality sensors and modern electronic components in PS-04 mean that it works both under high and low flow. The use of a screen basket on the temperature sensor prevents it from being damaged during installation, and does not have any negative impact on temperature measurements.



The unit can be used with AC W02 injection rail

Technical specification of PS-04:

Operating temperature [°C]	-40 do +125
Working pressure [bar]	up to 6,75
Working underpressure [bar]	up to 2,00
Gas inlet and outlet in a T-piece [mm]	Ø 12
Underpressure connection [mm]	Ø 4
Overall dimensions [mm]	38 x 41 x 44
Weight [g]	28

Standards and approvals:

PS-04 is compliant with the approval E8-67R-01 and UNECE Regulation No. 67.

STAG TAP-03



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



The unit has been largely extended while inheriting all the functions of STAG TAP-01/TAP-02 processors. Unlike the earlier models, STAG TAP-03 has been adapted to AC STAG software (diagnostic application for TAP-03 and STAG-4 QBOX, STAG-400 DPI controllers) and supports bluetooth+ interface.

The processor is offered in two versions: STAG TAP-03/1 and STAG TAP-03/2

- **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** engines with an electronic crankshaft position sensor and up to 2 electronic camshaft position sensors.

The unit is provided with extensive functions that were not presented in previous versions (TAP-01/TAP-02), including:

- support for 2 camshafts (covering camshaft variable timing adjustment),
- auto-calibration - automatic recording and detection of crankshaft and camshaft operating curves, which eliminates the problem with verifying the crankshaft cycle prior to installation,
- extended list of faults detected by the processor,
- improved method of dynamic advance timing angle change depending on current engine performance resulting in more dynamic performance of a gas-fueled vehicle compared to gas-fueling without the processor,
- reporting processor performance data directly from the application for easier and faster technical support from the manufacturer,
- clear and intuitive interface.

Power Chip



Power chip STAG tuning is used to increase the performance and efficiency of engines within the full rpm range. The operation results in a safe power increase, and, what is more important, torque increase by up to 20%, which significantly improves the engine response as early as at 1500 RPM. The vehicle becomes more dynamic, without higher fuel consumption.

Application:

- Turbocharged engines
- Diesel and petrol engines with electronic control

Benefits of chiptuning:

- more responsive and dynamic engine operation in any gear within the full rpm range,
- minimized effect of turbo-lagging,
- customized profiles of horsepower and torque curves,
- fuel consumption reduced by up to 14 %, when reasonable driving dynamics are maintained, particularly at low rpm.

Technical parameters:

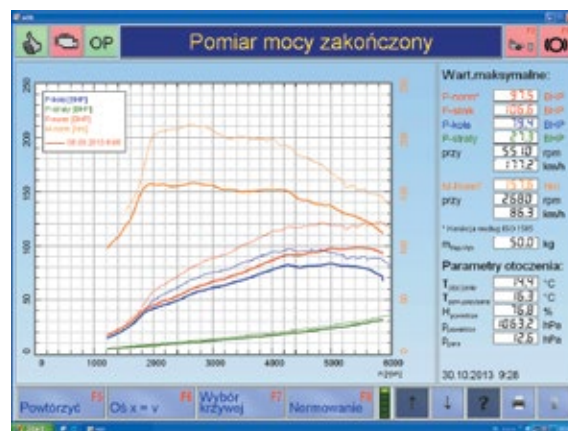
- integrated processor for emulating control signals,
- selection of torque and horsepower with the switch in 3 modes: Eco, Standard and Dynamic,
- no modification of ECU software required so the vehicle owner does not risk losing the warranty on the car,
- simultaneous emulation of 2 channels of pressure boost possible,
- no risk of engine check lamp activation,
- can be used in turbocharged Diesel engines with MAP sensors.

All engines in cars available in the market today have some potential that has been hidden by the manufacturer. The reason is the fact that vehicles in the factory are not adjusted individually, but in series and according to general operating settings. The Power chip STAG tuning unleashes the hidden reserves of power so that settings of cars can be optimized on an individual basis to allow the user to drive in a more dynamic, safer and even more economical way.

Comparison of the engine test bench performance results for two popular cars - Skoda Octavia and Skoda Roomster:

Octavia 1.8 - 160 HP	
Factory	after tuning
165 HP	193 HP
240 Nm	280 Nm

Roomster 1.2 tsi CBZB 105 HP	
Factory	after tuning
105 HP	114 HP
176 Nm	216 Nm



Key:
 Thick yellow – reference torque (factory)
 Thin yellow – torque after chip tuning
 Thin blue – engine power (factory)
 Thin red – engine power after chip tuning

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