



INSTALLATION INSTRUCTIONS

Preheater for Autogas Reducer

AC R01 CS

ver. 1.2 2013-12-05



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CONTENTS

1.	Technical data	3
2.	Intended use	3
3.	Principle of operation.....	3
4.	Status LED	3
5.	Circuit diagram and installation notes	4
6.	First start	5
7.	STAG-300 setup.....	6

1. Technical data

Power supply voltage:	12V ±25%
Current:	up to 60A
Operating temperature:	- 40°C ÷ 105°C
Reducer heating temperature:	-5°C ÷ 60°C

Caution! This product should not be installed in vehicles with poor condition of electrical systems (or batteries).

2. Intended use

The preheater unit is an electrical device designed to support the warm-up of AC reducers. Electrical heating of the reducer section allows the engine to be switched over to gas earlier, or, if weather conditions allow, to be started up on gas (with no petrol fuelling).

3. Principle of operation

The preheater control unit measures the temperature of the reducer whenever ignition is switched on. If the detected temperature is lower than required for a safe engine start-up on gas, the heating cycle is activated (see Operating Status Indication LED).

A heating element converts the electric current into heat required to vaporize the liquid gas. With automatic adjustment algorithms applied, the control unit provides optimum output of the heating element to ensure the required operating temperature even under step changes in reducer load and to minimise the electric energy consumption for protection of the vehicle electrical system.

When the preheating is completed and the reducer reaches its safe temperature level, the user can turn the vehicle engine on. The preheater will monitor the reducer block temperature until the engine temperature exceeds the minimum safe value and compensate excessive reducer cooling, when needed.

Due to the nature of the physical reactions in the process, it is recommended to drive under relatively low engine load until preheating is completed.

4. Status LED

The preheater operating status is indicated with a light-emitting diode (LED).

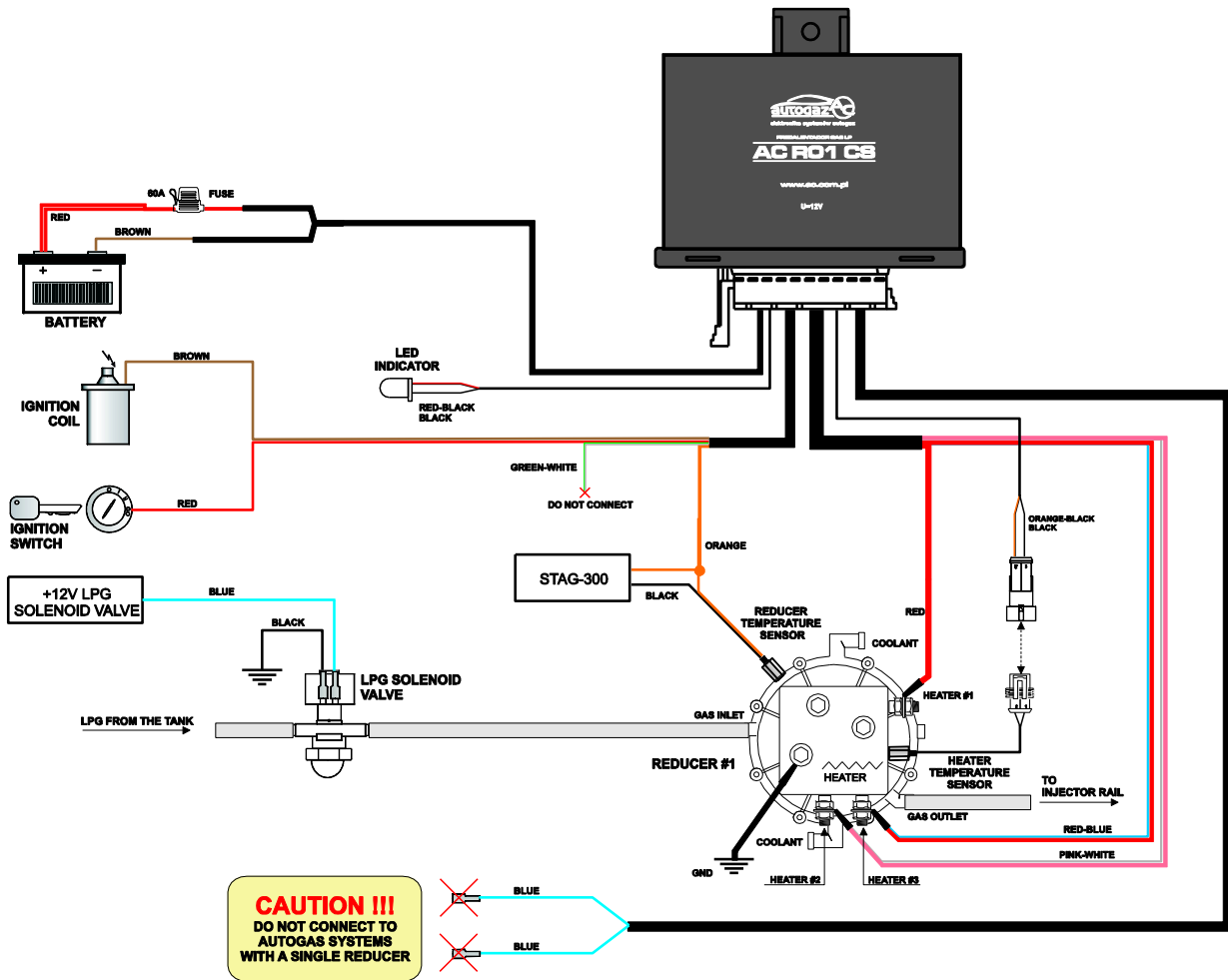
LED status (continuous light)		Description	
Off		Preheater is not active. Ignition signal missing or the reducer is warm.	
Amber		Preheating in progress. It is recommended to keep the engine off.	
Green		Reducer heating is completed or engine speed signal is detected. Driving under low engine load is recommended.	
Preheater fault indication (flashing LED)			
Red	- •	one long pulse followed by one short pulse	Glow plug #1 failure
	- • •	one long pulse followed by two short pulses	Glow plug #2 failure
	- • • •	one long pulse followed by three short pulses	Glow plug #3 failure
	- -	two long pulses	Heating element temperature sensor failure
	- - -	three long pulses	Reducer temperature sensor failure

5. Circuit diagram and installation notes

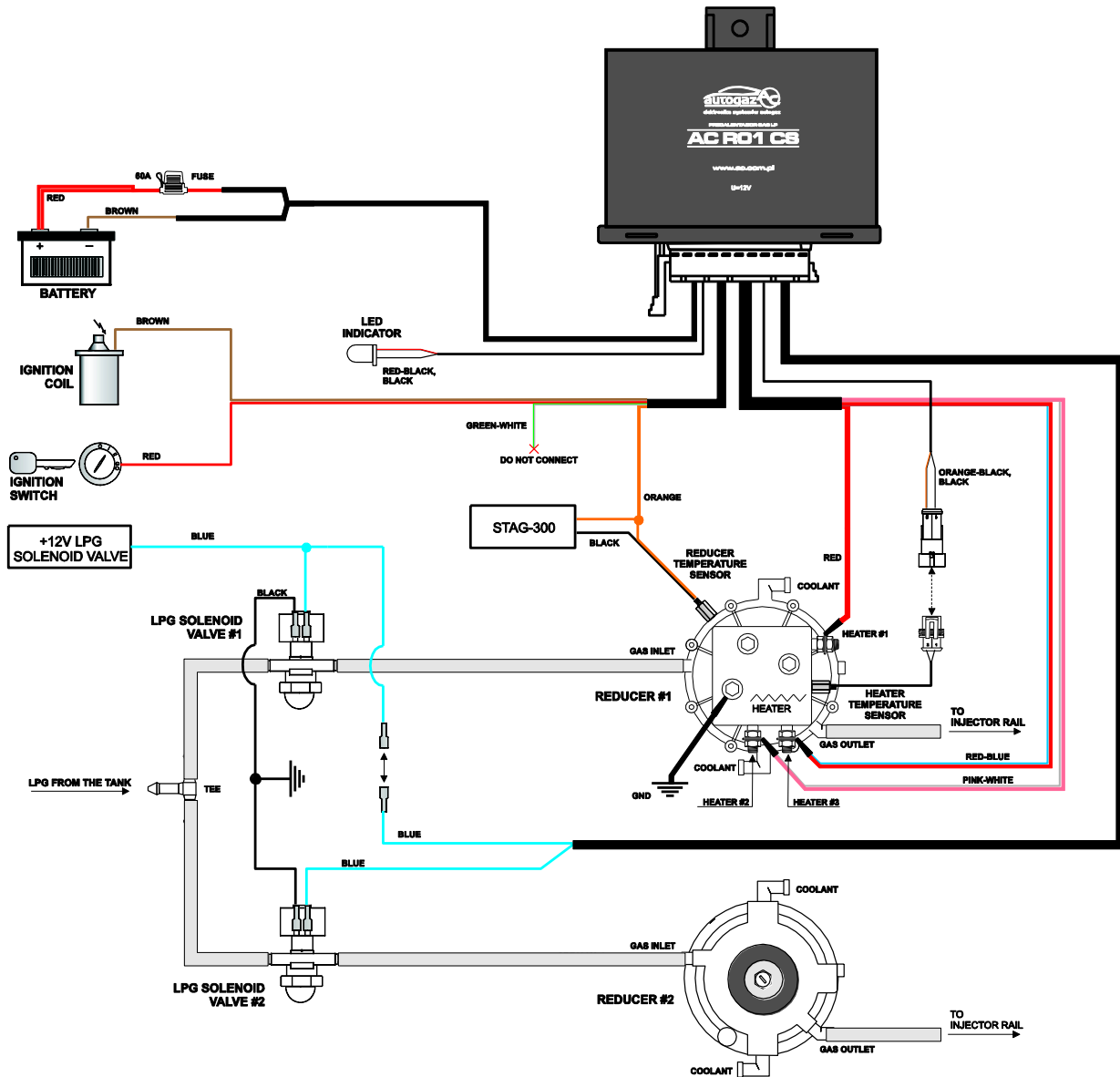
The preheater should be installed in a location that is not exposed to moisture and high temperatures, if possible. Due to the high current levels used by the device, extensions of the electrical cables supplied with the kit should avoided.

The AC 01 CS unit can be be used in LPG installations based on one or two reducers.

REDUCER PREHEATER v2.0 WIRING DIAGRAM (for one reducer)



REDUCER PREHEATER v2.0 WIRING DIAGRAM (for two reducers)



NOTE: Failure to follow the installation instructions for the preheater may result in problems with the LPG system and/or vehicle electronic systems.

6. First start

The installed system is ready for operation. No additional adjustments are required. The automatic control unit follows the engine/reducer parameter curves, which ensures optimum working conditions and safe use of the LPG installation.

7. STAG-300 setup

Starting the engine on gas requires activation of the max. gas injection time limit by using a value that guarantees correct fuel-air ratio. This option is particularly useful in engines that enrich fuel-air mixtures during a cold start. The setting should be adjusted individually, with a close relation to engine dynamic performance under the maximum rotation (rpm) threshold level. The fuel-air mixture of a warmed engine should not be lean.

The screenshot displays the AC GAS SYNCHRO 10.4.0.2 software interface. The main window is titled 'Parameters' and includes tabs for 'AutoCalibration', 'Errors', 'Map', 'Data recorder', and 'AutoAdaptation'. The 'Gas controller settings' tab is active, showing various configuration options. A red circle highlights the 'Max. gas injection time' setting, which is set to 20.0 ms. A red arrow points to this setting. Other settings include 'Switch-over threshold' at 1.6 [Bar], 'Pulse frequency' at 2 [1/s], and 'Max. RPM' at 1100 [rpm]. The right sidebar displays real-time data for various parameters: PRESSURE [Bar] (Gas 1,07, MAP 0,24), INJECTION TIME [ms] (Petrol and Gas values for P1-P8 and G1-G8), TEMPERATURE [°C] (Gas 31, Red. 85), VOLTAGE [V] (Lambda 1 0,00, Lambda 2 4,88, Battery 11,51), RPM [rpm] (RPM 720), and Engine load (0%). The bottom status bar shows 'Connected', 'STAG-300-8 premium ver. 10.1 7.1.0 2014-06-13 14:22:08', and a 'Gas' indicator.

Changes in firmware ver. 10.0:

- gas fuelling is now the default operating mode;
- gas controller fault does trigger switching to petrol;
- with no gas in the tank, the engine can be started in an emergency mode only (i.e. with petrol fuelling);
- petrol fuelled start requires adherence to the emergency start procedure;
- when working in the emergency mode, it is possible to switch the fuel types at any time;
- autocalibration and vehicle tuning operations should be carried out in the emergency start mode.