

# R90/E



# LPG REDUCER

## Use and Maintenance Instructions

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## 1. Introduction

- The scope of this manual is to:
  - 1 Facilitate the Use and Maintenance of the LPG reducer;
- The information here detailed don't substitute standards and/or regulations, valid where the Installation is performed at that time.

## 2. Safety conditions

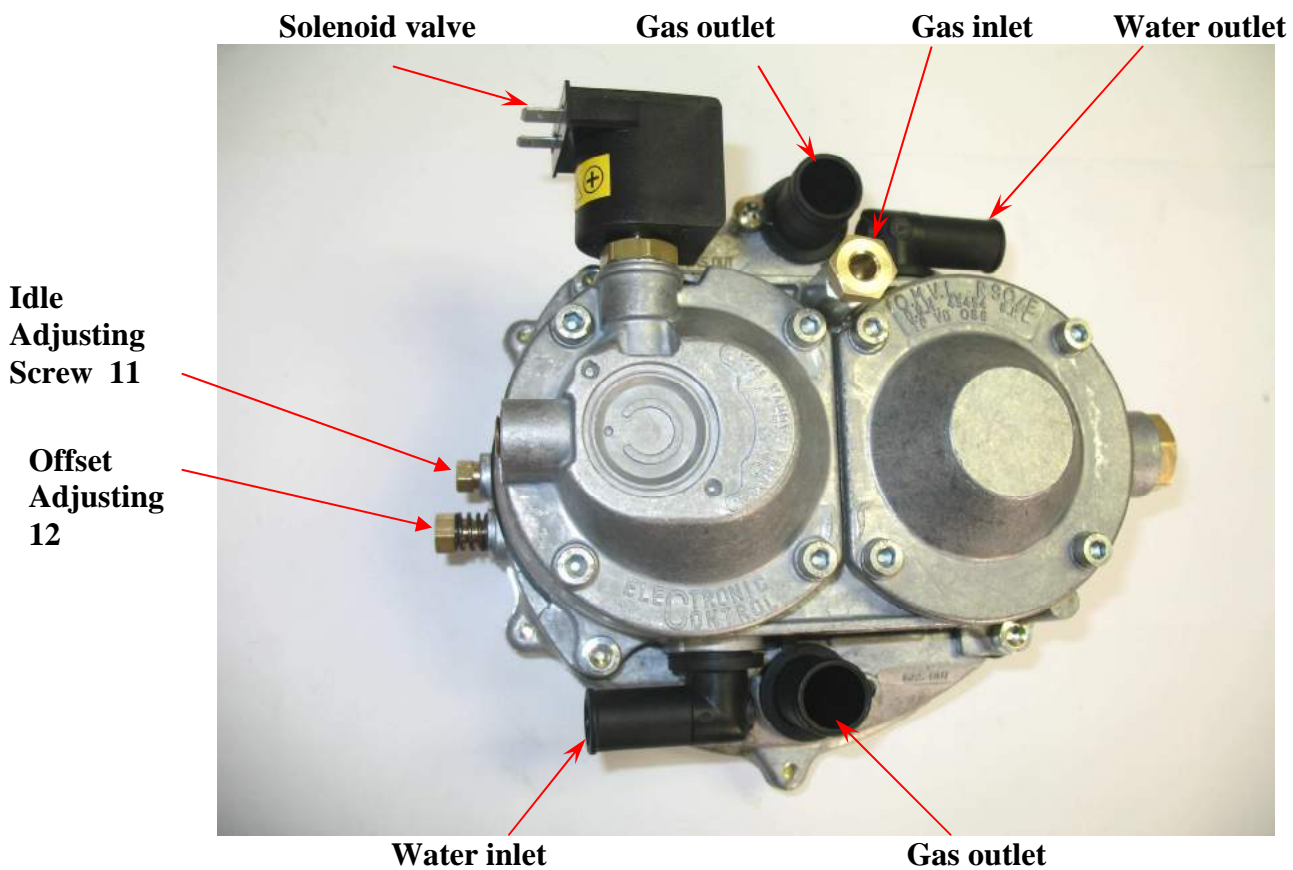
- The **R90/E LPG reducer**, if not installed in the right way, can give wrong working or damaging to the vehicle and/or to the people.
- Also engine emissions and performances may be influenced by a wrong installation.
- This manual is a guide for Qualified Technician in the automotive field. The reducer, must be installed only by suitably instructed and qualified people, in agreement with the instructions of this manual.
- **OMVL** declines every responsibility directly or indirectly due and/or caused by a wrong interpretation or execution of any part of this manual.
- This manual must be deeply studied and understood before converting the vehicle.
- To prevent gas leakages, that can cause fire or explosion, don't smoke, avoid sparks, free flame and operations with electrical devices, near engine vane and during re-fuel.
- The user of the vehicle and any other person unauthorized, have not to do any type of regulation and/or modification of the installed system. Every operation on the system is allowed only on authorized workshops and by suitably instructed technicians. A wrong Use Maintenance of the system will jeopardize the vehicle safety.

## Mechanical components installation procedure

### R90/E pressure reducer installation

#### Technical Features

- Type: Double stage
- Pressure reduction system: By spring/membrane
- Heating system: By engine cooling liquid ( Water )
- Activation device: Solenoide valve
- Maximum flow rate: 28Kg/hr

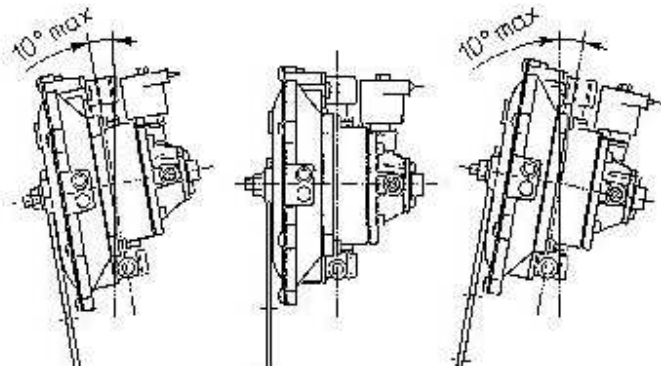


#### 3.1.1. R 90/E reducer advantages

- It's the only one on the market with “**Self Controlled pneumatic Pilot**” (patented). This device has the scope to keep a constant pressure in the chamber where the engine is fed, at every gas flow rate with every rpm values.
- The only one that can be successfully used at every cylinders volume, **from 0,5 to 6,0 lt.**
- **Double gas outlet** to make easier the installation and connections (the outlet not used is closed by a special cap in equipment).
- **Safety valve** to avoid reducer fails and eventual damages to people and things, in case of overpressure inside reducer chamber.
- **Supplementary idle device**, studied to avoid sudden engine switch off in case of strong braking or fast bend.

### 3.1.2. Reducer installation instructions

- Reducer must be installed, in the engine vane, in vertical position, as much protected as possible to avoid damaging in case of car crash. It must be firmly fixed to the vehicle body (the bracket in equipment is a good support), to allow a good “grounding” of the component.
- Reducer angle on the vertical axis, must not exceed  $\pm 10^\circ$ , as shown in fig. beside.
- Pressure reducer must be fixed, closed to engine cooling liquid pipes and closed to the mixer.
- Install the reducer far from exhaust manifold, to avoid gas uncontrolled overheating at reducer outlet.
- Fix the reducer at a lower level than the top of the cooling circuit into the heater. If this is not possible, carefully vent from air the engine cooling circuit before sealing it again. Air bubbles in the circuit can reduce efficiency in heat exchange between the two fluids.
- Don't fix the reducer to the engine. High heat and vibration could seriously damage it.
- Pipes connecting reducer to the engine cooling circuit, have to be a bit longer than the minimum required length. This to avoid pipes obstruction during engine running and to permit an easy reducer disassembly from its bracket, in case of small repairs, without disconnecting the pipes.
- Protect the venting hole on the steel cover from air flow coming from the engine cooling fan. A strong air flow on low pressure membrane, can cause wrong engine operation due to incorrect gas flow rate.



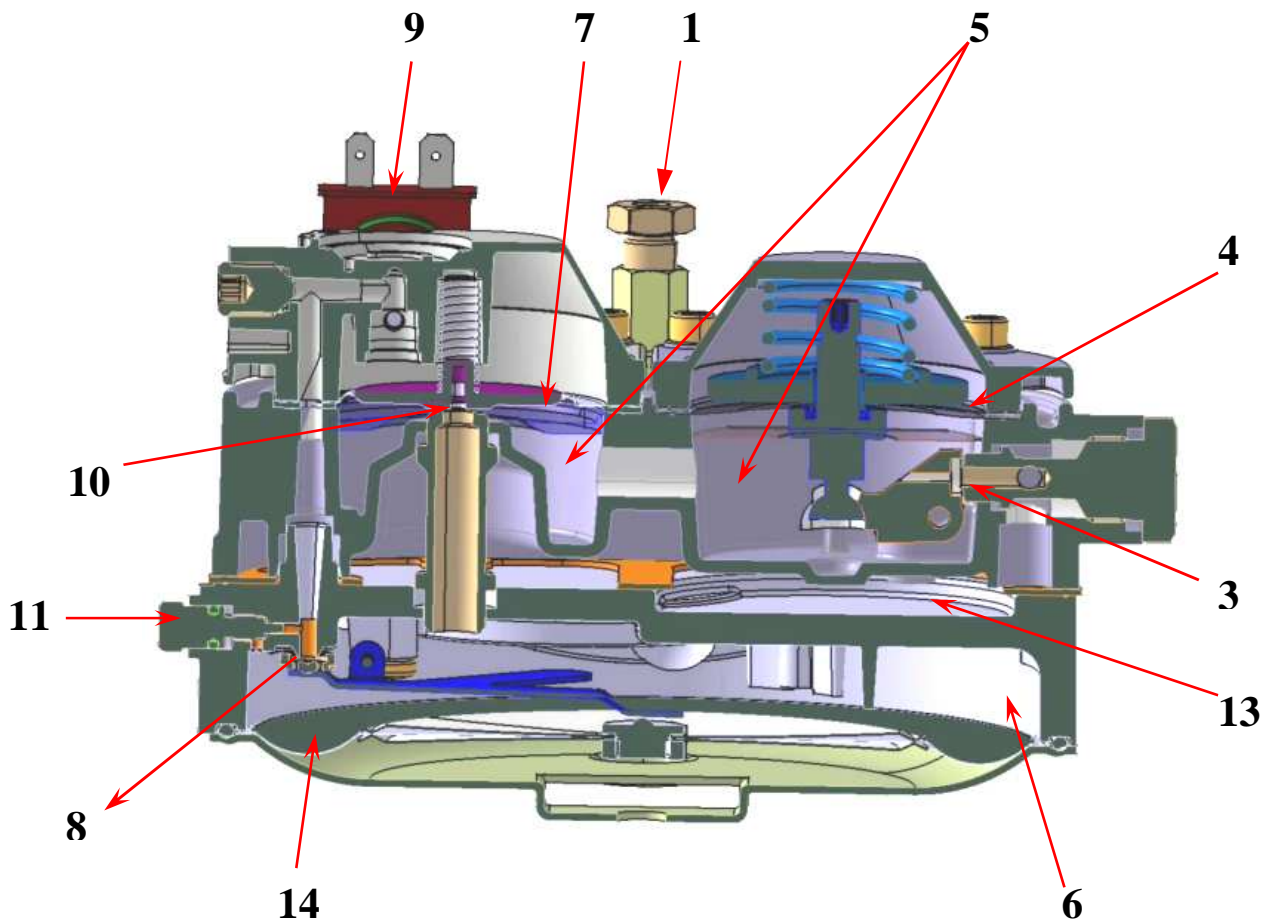
### 3.1.3. Reducer working principles

LPG flows from the tank to the reducer through a inlet nipple(1)

**1° Reduction stage.** The *High Pressure Valve (3)*, is controlled by *High Pressure Membrane (4)*.

This regulates gas flow in the double *Chamber of heating and expansion (5)*, where pressure is reduced till 60kPa. From here gas flows to the 2° reduction stage.

**2° Reduction stage.** It is constituted by a *Chamber (6)*, in communication with the mixer, placed upstream the throttle valve. The *Membrane Unit (7)*, through the *Valve (8)* actuated by the *Membrane (14)*, feel the suction generated by engine pistons. The *Valve (10)*, controlled by the just mentioned unit, regulates gas flow from 1° stage Chambers (5) to 2° stage Chamber (6), where pressure is further reduced till atmospheric ( $0\pm 20$  Pa). From here, gas flows into intake manifold where it mixer with air coming from engine air filter, before flowing inside cylinders ignition chambers.



Vaporizer



**Engine cooling liquid chamber**

**Shut off valve.** A *solenoid valve (9)*, controlled by gas/petrol switcher, cuts gas flow from 1° to 2° stage, at the same time the engine is switched off. This happens both in case of intentional and casual switching off (in case of damaging, accident, fuel completely consumed, etc).

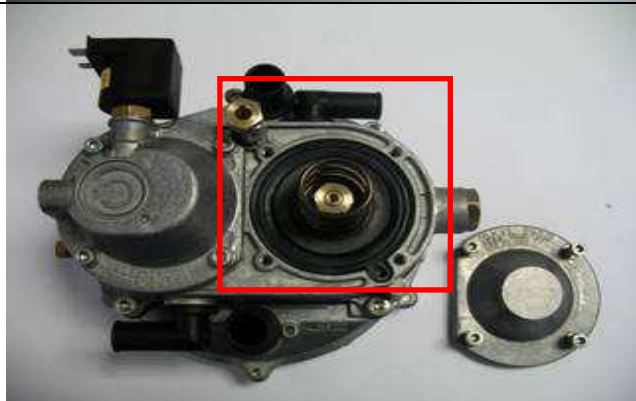
**Heating system:** LPG expansion due to pressure reduction, has the effect of a temperature reduction. To avoid icing inside the reducer, and to get the best efficiency from the fuel, the chambers where gas is expanding, are heated up by *engine cooling liquid (13)*.

**Carburetion adjustment screws.** Beside reducer there are 2 adjusting screws. The hexagonal M10 screw is the *Offset adjusting screw (12)* and allow to modify the delivered gas quantity. The hexagonal M8 screw is the *Idle adjusting screw (11)* and it's usually closed. It must be unscrewed only in the case the engine is switching off, in case of strong braking or fast bend.

#### 4.1 1° Stage membrane substitution



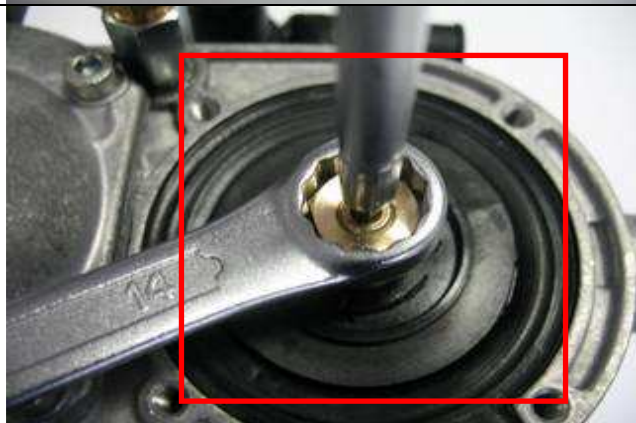
**Remove the I stage cover screwing out the 4 screws**



**Remove carefully the 1<sup>st</sup> stage cover paying attention to the internal spring compression**



**Remove the spring**



**Unscrew the regulation spring nut turning anticlockwise the wrench**



**Remove the spring**





**Remove carefully the plate and the membrane group**



**Verify the status of 1<sup>st</sup> stage internal chamber**



**Substitute the membrane group**



**After placing the 2 regulation spring verify that the membrane appendix is inside the hole.**



**Screw the 4 screw following cross procedure and using a torque of 5[Nm]**

## 4.2 Substitution of High pressure Shutter

	<p><b>Unscrew the 2 M5x6</b></p>
	<p><b>Remove the pin</b></p>
	<p><b>Blow compressed air in the hole until the rubber shutter comes out.</b></p>
	<p><b>Change the rubber shutter and place it as in the original position. Check carefully. Screw the the 2 M5x6 with a torque of 3[Nm]</b></p>

## 4.2 2°Stage membrane substitution



Remove the 2°stage cover screwing out the four screws



Gently rise the membrane extracting carefully the connected spring from its cover side, avoiding to stretch it.



Remove the brass cone, clean it., from Change the membrane and screw the cone with a torque of 0,6[Nm]



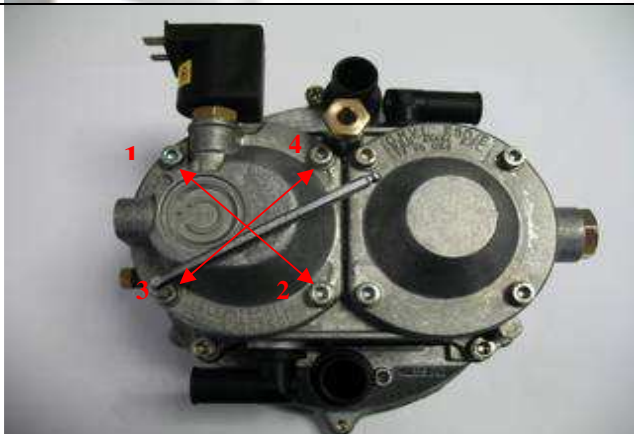
Verify the status of 2°stage internal camber



**Position the new membrane connecting the membrane hole with the relevant body ferrule**



**Insert the membrane spring in its cover side**



**Fix the 2<sup>nd</sup> stage cover, screwing the four screw following a cross scheme 1-2, 3-4, with a torque of 5[Nm]**

#### 4.4 Low pressure membrane substitution



Remove the back cover screwing out the six screws



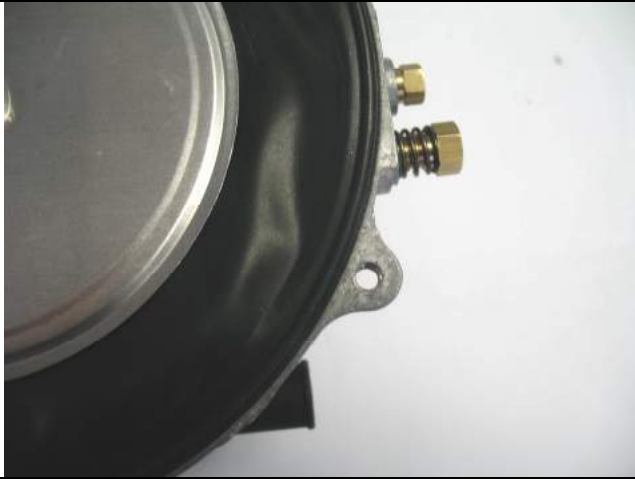
Remove the membrane from its seat maintaining it horizontal, as shown by the green arrow. Do not force the membrane vertically (red arrow)



Position the new membrane connecting the back hook to the black metal lever.



Fixing the membrane use a torque of 3[Nm]

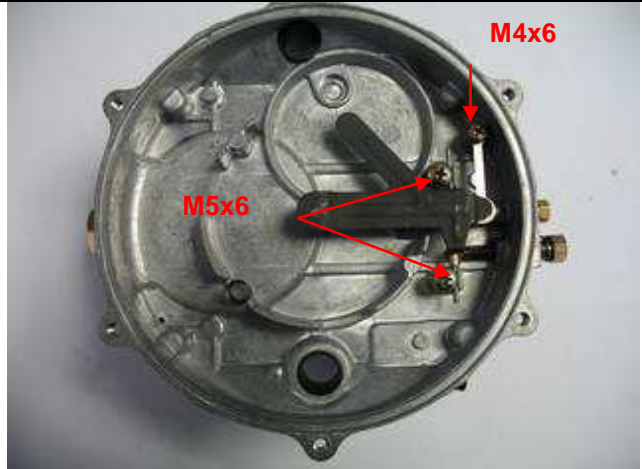


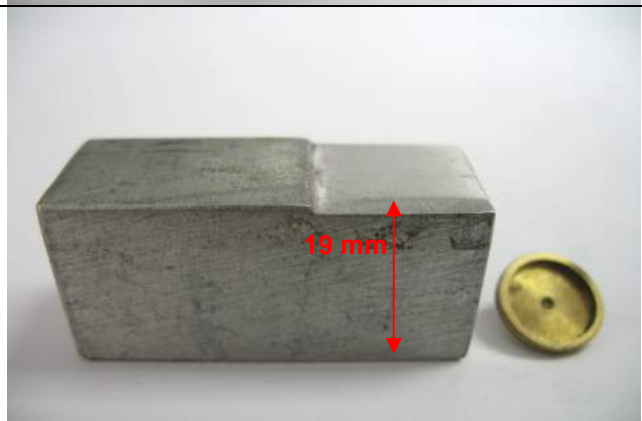


**Insert carefully the membrane O-ring gasket to the channel around the aluminium body.**



**Fix the back cover screwing the six screws following a cross scheme 1-2,3-4, 5-6, using a torque of 2,5[Nm]**

#### 4.5 Substitution of low pressure leaf-spring

 <p>M5x6</p> <p>M4x6</p>	<p>Remove the M5x 6 and remove screw M4x6 and remove leaf spring.</p>
	<p>Make sure that the leaf-spring is perfectly centered and remains slightly separated (about 1 mm) from the slot without bending the arm. Screw with a torque of 2,5[Nm]</p>
 <p>Heigth= 19 mm</p>	<p>Re assembly the lower pressure lever and check the height = 19 mm.</p>
 <p>19 mm</p>	