

## Technical Installation Guide



## ID Technical Document: DT\_IS\_GAI-005

Rev.	Date	Review n.	Issued by	Reviewed/ Approved
0	13/04/2007	First Issue	Technical office ROS	Technical Manager DTE
0	19/02/2009	Second Issue	Technical office ROS	Technical Manager DTE

### INTRODUCTION

This manual provides information about the installation of Zavoli S.r.l. gas systems. The process requires the support of specific equipment and specialized personnel.

Our goal is to provide guidelines about the installation and fine-tuning of our injection systems. In particular, this manual is designed for anyone who:

- installs or fine-tunes “Alisei” gas systems,
- needs a reference guide about the installation of these systems,
- wishes to understand or improve their knowledge of the “Alisei” gas system operating principles,
- needs support to fine-tune the system or solve specific issues.

For more information about the “Alisei” gas system, please refer to the other manuals published by Zavoli S.r.l.

## General Index

	<b>Introduction.....</b>	<b>.....2</b>
<b>1.</b>	<b>Installation of Mechanical Parts.....</b>	<b>.....4</b>
<b>1.1</b>	<b>Component Location .....</b>	<b>.....4</b>
<b>1.1.1.....</b>	<b>Regulators .....</b>	<b>.....4</b>
<b>1.1.2.....</b>	<b>Gas Solenoid Valves .....</b>	<b>.....5</b>
<b>1.1.3.....</b>	<b>Installation of the MAP.....</b>	<b>.....7</b>
<b>1.1.4.....</b>	<b>Gas Filter and Temperature Sensor .....</b>	<b>.....7</b>
<b>1.1.5.....</b>	<b>Injection Nozzles .....</b>	<b>.....8</b>
<b>1.1.6.....</b>	<b>Gas Injectors .....</b>	<b>.....10</b>
<b>2.</b>	<b>Electrical Wiring.....</b>	<b>.....10</b>
<b>2.1</b>	<b>Main Cables.....</b>	<b>.....11</b>
<b>2.2</b>	<b>Injector Cut-Off Cables .....</b>	<b>.....11</b>
<b>2.3</b>	<b>Connection of the Gas Injectors.....</b>	<b>.....13</b>
<b>3.</b>	<b>Fine Tuning.....</b>	<b>.....14</b>
<b>3.1</b>	<b>Self-Calibration .....</b>	<b>.....14</b>
<b>3.2</b>	<b>Map. ....</b>	<b>.....15</b>
<b>3.2.1.....</b>	<b>Carburetion Check .....</b>	<b>.....18</b>
<b>4.</b>	<b>Available Kits .....</b>	<b>.....19</b>
<b>5.</b>	<b>Calibrated Jets – Sizing Charts .....</b>	<b>.....20</b>

## 1. Installation of Mechanical Parts

### 1.1 Component Location

Before installing your **Alisei-Zeta** (LPG) and **Alisei-Mir** (Methane) system components, find a location inside the engine chamber which allows for the following operations to be easily completed:

#### 1.1.1 Regulators

- Maintenance and adjustments.
- Inbound and outbound connections with the engine cooling liquid should be easily accessible. Tubing should be kept as short as possible and should not be bent (fig. 1.1.1-1).
- The tube connecting the gas outlet on the regulator and the gas inlet on the injectors should be kept as short as possible (as indicated in the General Installation Manual, the maximum length is 700mm).
- The depressurization tube on the regulator should be kept as short as possible. The hole must be drilled right below the throttle valve, above the tubes branching off of the intake manifold and connecting to each individual cylinder (as indicated in the General Installation Manual, the maximum length of the tube is 700mm). See Fig. 1.1.1-2A for the Methane Regulator and Fig. 1.1.1-2B for the LPG Regulator.
- Do not use forks to connect the depressurization tube to the over-pressure valve. Connections for the LPG regulator should be separate. See Fig. 1.1.1-2B.
- The correct position of reducer during installation **with gas exit** (fig. 1.1.1-2B).

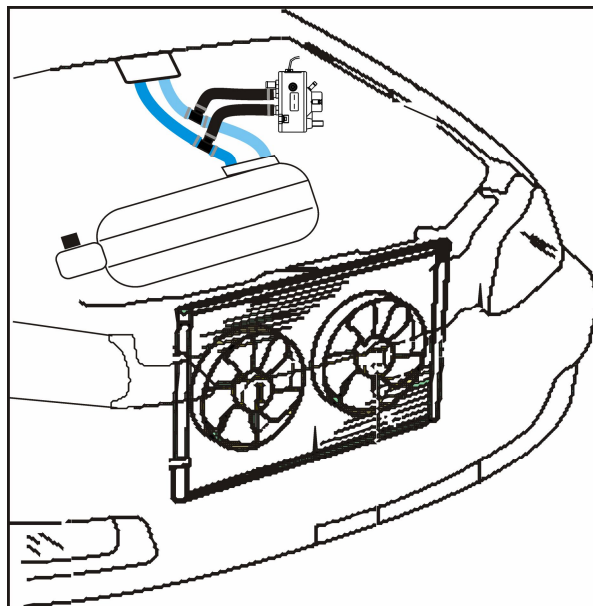


Fig. 1.1.1-1

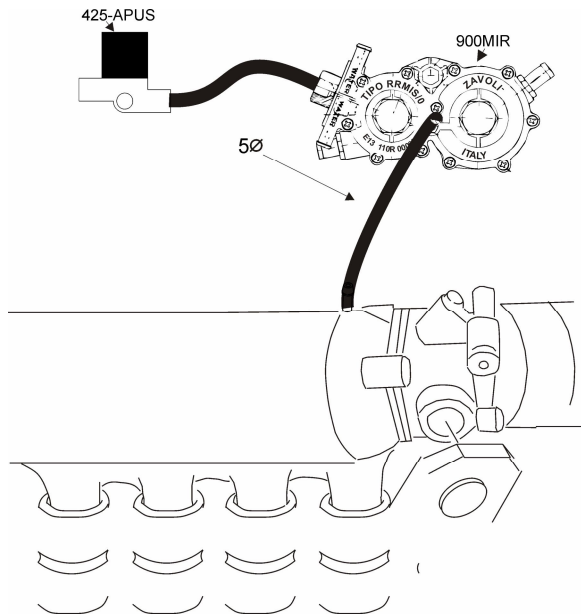


Fig. 1.1.1-2A

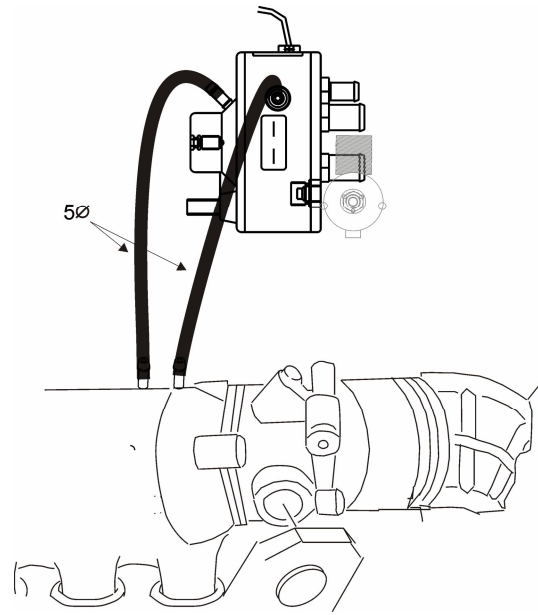


Fig. 1.1.1-2B

## 1.1.2 Gas Solenoid Valves;

For the LPG (AliseiN) kit three different types of valves can be used. Choose the most appropriate model in accordance with the type of kit installed in the vehicle.

- In Fig. 1.1.2-1A, the solenoid valve has been installed right above the regulator. The regulator shown here is a basic model, and the valve is the kind commonly used for standard 4-cylinder vehicles. The connection with the regulator is established by means of a 6mm copper pipe, positioned in such a way as to allow for easy maintenance and replacement of the filters.
- When connecting the copper pipe, make sure to clean the pipe and check that shavings have not fallen inside it.
- The valve used in Fig. 1.1.2-1B is the kind designed for 5-6-8-cylinder vehicles, and it has been connected directly to the regulator. For “super” versions of the regulator, the connection is the same as for 5-6-8-cylinder vehicles – except for the feeding tube, which is a Ø 8mm instead of a Ø 6mm (see Fig. 1.1.2-2C).
- Make sure not to tighten the joint too much, as this may cause its base to break.

For Methane (Alisei-Mir) kits;

- The solenoid valve must be installed above the regulator.
- The fuel level sensor must be installed on the valve (see fig. 1.1.2-3).

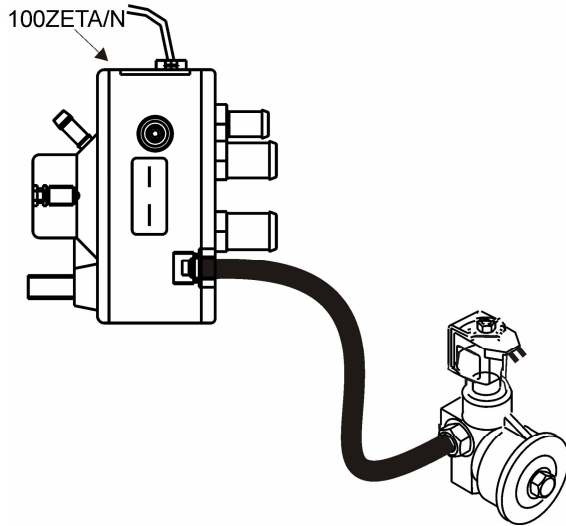


Fig. 1.1.2-1A

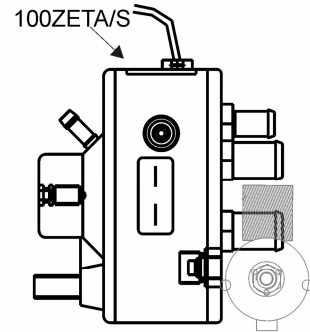


Fig. 1.1.2-1B

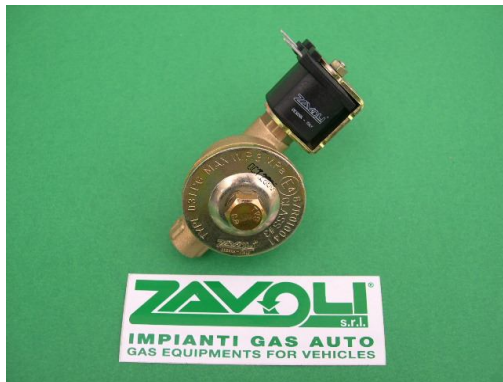


Fig. 1.1.2-2A



Fig. 1.1.2-2B



Fig. 1.1.2-2C



Fig. 1.1.2-3

### 1.1.3 Installation of the MAP:

For AliseiN and Alisei-Mir kits;

- The sensor must be secured to the body of the vehicle. Avoid potentially hot areas.
- Tubing should be kept as short as possible (MAX 500 mm, fig. 1.1.3-1).
- The connection to the depressurization area should be established by means of a  $\varnothing$  4mm rubber tube. One end of the tube must be connected to the joint on the sensor marked by a "V", while the other end must be connected to the joint supplied with the kit. Remember to perforate and thread the joint before installing it on the intake manifold.
- To gauge the pressure of the injector rail, a connection must be established between the sensor and the injectors. Use a  $\varnothing$  4 mm rubber tube. Connect one end of the tube to the joint on the sensor marked by a "P", and the other end to the joint on the injector rail supplied with the kit.

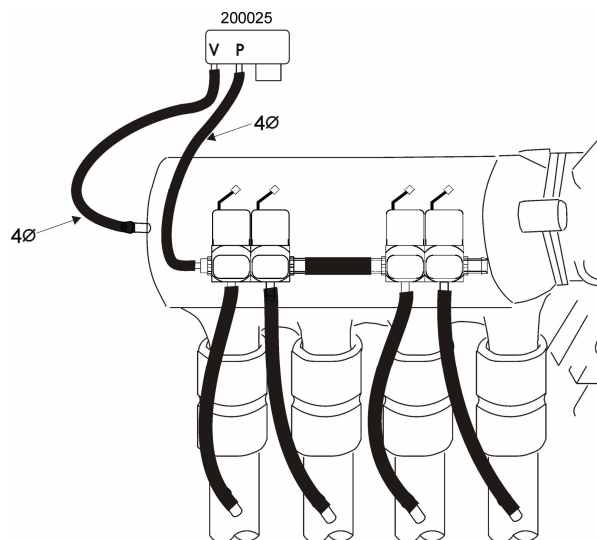


Fig. 1.1.3-1

### 1.1.4 Gas Temperature Filter and Sensor

For a correct installation of these components:

- The gaseous-phase filter must be installed on the regulator output. As indicated in the General Installation Manual, we recommend users to perform regular scheduled replacements of the filters.

Pag. 7 di 25

- The temperature sensor must be installed near the gas injectors, right after the gas filter by the regulator output.

## 1.1.5 Injection Nozzles

The position of nozzles (located on the intake manifold, fig. 1.1.5-1A) is a key element in the correct installation of sequential injection systems:

- We suggest that you clearly identify all the parts of the intake manifold that will have to be perforated.
- Drill your holes near the engine head, as shown in fig. 1.1.5-1B.



Fig. 1.1.5-1A

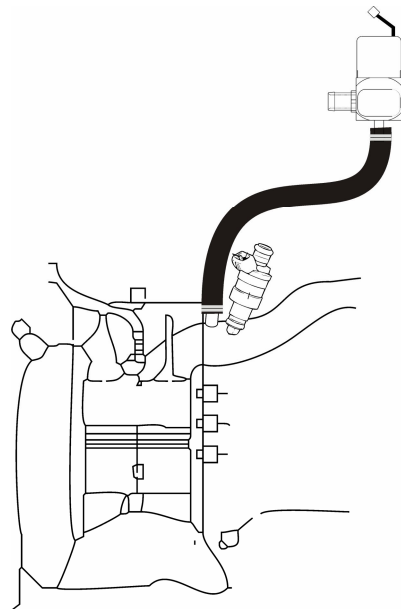


Fig. 1.1.5-1B

- Each nozzle must be installed at a 90 degree angle with the intake manifold – or at least at such an angle that jets are directed toward the engine rather than toward the throttle valve (fig. 1.1.5-2).

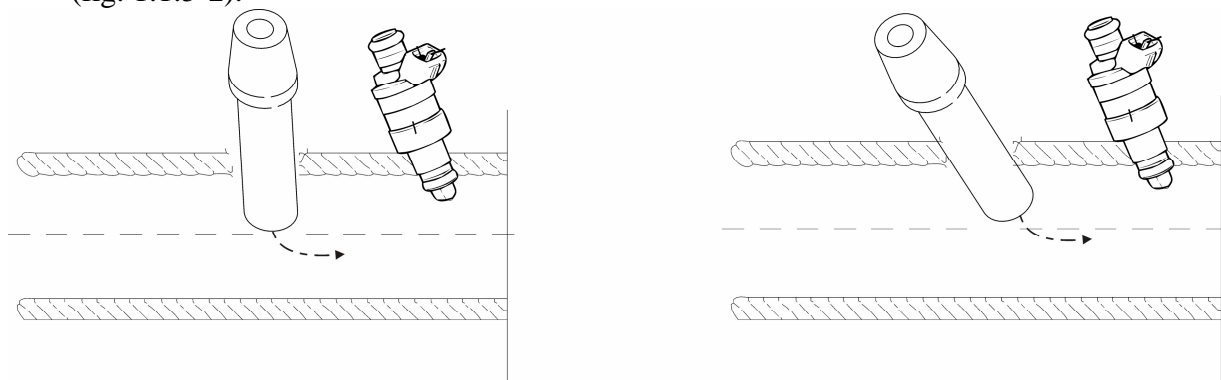


Fig. 1.1.5-2

- Before drilling any holes in the intake manifold, please make sure that nozzles are positioned in a way which allows the tubes connected to the injectors not to exceed the maximum length of 150mm.



- Beside these standard injection nozzles (supplied with your kit) Zavoli s.r.l. manufactures two more types of nozzles. The one shown in fig. 1.1.5-3 features an extra opening, located on the side of the nozzle and marked by a spot in the hollow of its bottom part. The spot helps identify the direction of the hole, and represents a reference point for a correct installation of the nozzle. (Fig. 1.1.5-4A).



Fig. 1.1.5-3

- The injection nozzle shown in fig. 1.1.5-5 can be fixed inside the intake manifold by means of a Teflon tube. This type of installation can be particularly useful when drilling holes according to directions (near the engine head, etc.) is not an option. See fig. 1.1.5-4B.

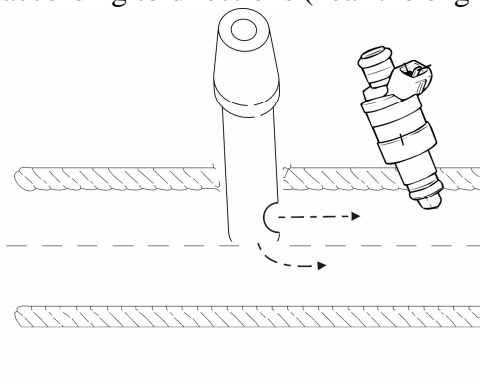


Fig. 1.1.5-4A

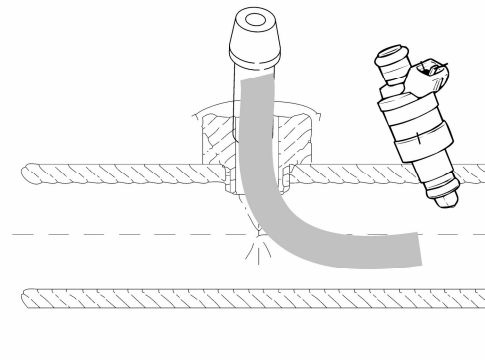


Fig. 1.1.5-4B



Fig. 1.1.5-5

### 1.1.6 Gas Injectors

One of the main features which make our Pan injector (fig. 1.1.6-1) an extremely handy component is that it is a modular injector - i.e. it can be installed individually or in rails of two, three and so on (fig. 1.1.6-2). This characteristic makes it easier to keep the tube connecting the injection nozzle and the injector as short as possible.

- We suggest that careful attention be paid to any existing bends in the connecting tubing installed between the injectors and the intake manifold. Please make sure that bends are “soft” and flexible, and that enough room is allowed for the tubing. Make sure that the tubing does not get “crushed”, as this may prevent the system from working correctly.
- Use the metal bands supplied with the kit to tighten the connecting tube.
- Tighten the injector.
- Make sure that all jets are the right size and diameter.



Fig. 1.1.6-1

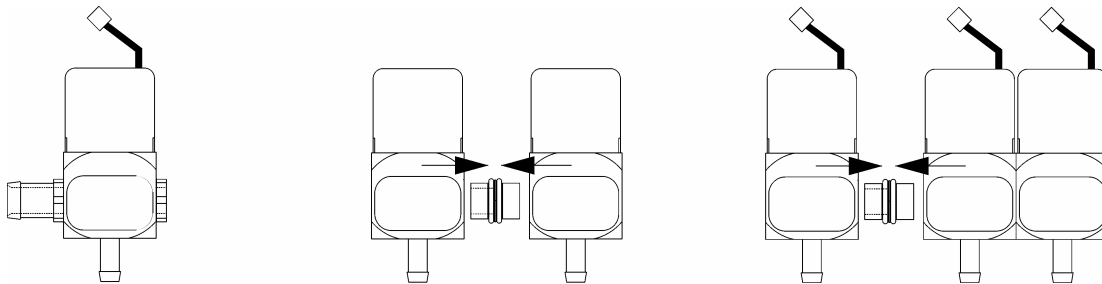


Fig. 1.1.6-2

## 2. Electrical Wiring

The following are general directions which should be considered valid for any type of vehicle. It is important to be fully aware of these directions, as they represent a key factor in understanding how the entire system works.

Here are some of the most important points to remember for a correct installation:

- All connections involving wires that are not joined to a connector must be soldered. Connections must be watertight and properly insulated.
- When installing electrical wiring for your Retrofit kit, please follow the original wiring system of your vehicle.

- Securely fix the wires with metal bands to prevent loose wires from rubbing together (or against moving/fixed parts of the vehicle or the engine) and getting damaged.
- Please make sure that wires are not too taut, as vibrations may damage these connections.
- The gas tube should never be used as a support for an electrical wire or any other kit component.

## 2.1. Main Cables

Main cables are a complex electrical component of the system, which includes a number of thin wires connected to stiff connectors. It is therefore recommended to handle it with great care during all phases of the installation process. In particular, pay careful attention to the following:

- All cables must be installed at a safe distance from the fuses and their corresponding wires.
- Connect all the ground wires at a point which ensures good electrical contact (battery negative pole).
- Do not force connectors into their sockets. Connectors are of a “polarized” kind – in other words, they will only fit into their socket if inserted the proper way. Connections that do not have a connector (lambda signals, connection under the key slot, battery positive and negative poles) require soft brazing (watertight soldering).
- Install the fuse in a position which is easily accessible.

## 2.2 Injector Cut-Off Cables

There are different kinds of injector cut-off cables which can be connected to the injection control unit. To determine the type of cable to be used for each specific vehicle, check which PIN (on the petrol injector connector) the injector positive wire is connected to. In order to identify your positive wire, please follow these directions:

- Disconnect all connectors from the injectors;
- Take your multimeter and select the continuous current reading function;
- Select the ‘ground’ setting for the negative pointer;
- Set the positive pointer in one of the two contact points for the injector cables;
- Turn the dashboard controls on and using your multimeter, check if current is at +12V.
- If this is the case, the selected wire is the positive one.

Cables feature either “BOSCH” or “JAPAN” connectors, which can be attached directly to the petrol injectors. To determine what kind of connector to use, check the polarization of the petrol injector cables.

200SA144 (“Bosch” connectors), 200SA144J (“Japan” connectors), 200SA143 (used for 3 – 5 – 6-cylinder vehicles), to be used when the petrol injector positive pole is on PIN n.1 and the negative is on PIN n.2. Please refer to fig. 2.2-1.

200SA144INV (“Bosch” connectors), 200SA144JINV (“Japan” connectors), 200SA143INV (used for 3 – 5 – 6-cylinder vehicles), to be used when the petrol injector positive pole is on PIN n.2 and the negative is on PIN n.1. Please refer to fig. 2.2.-2.

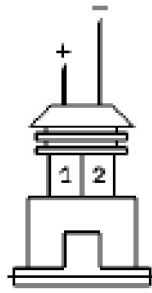


Fig. 2.2-1

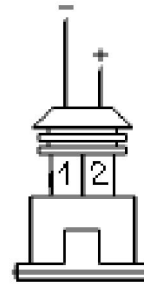


Fig. 2.2-2

In some cases, when installing the injector cut-off cables, it may not be possible to use the connectors provided with this kit. In this case, connect the wires directly to 200SA144U universal cables. Follow the example in fig. 2.2-3.

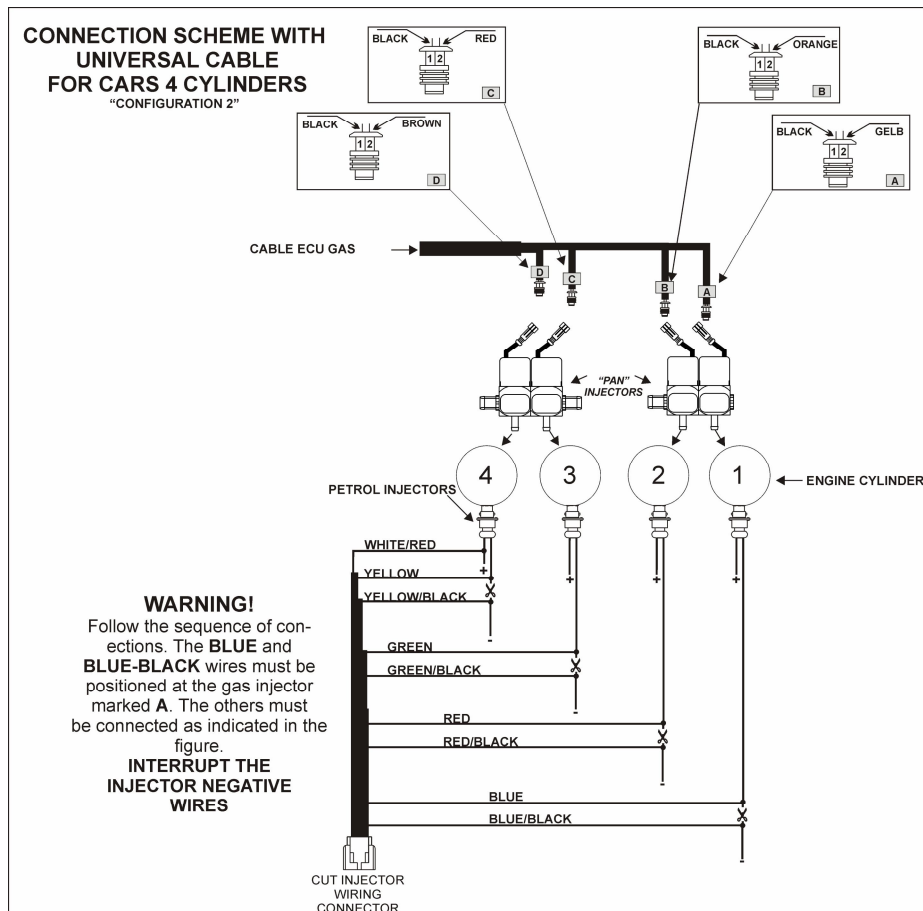


Fig. 2.2-3

**The direction of your connections is very important. BLACK wires should be going to toward the petrol injection control unit, others toward the injectors.**

## 2.3 Connection of the Gas Injectors

In order to install the gas injector cables correctly, please follow the order of the emulator cables very carefully. Gas injector outlets and cables are individually identified by letters (A, B, C, D). For 5-6-8-cylinder vehicles, cables include two extra connectors and two extra sheaths (marked by two red bands) to allow for the second bench to be connected. The sheaths of the gas injector cables are identified by letters E, F, G and H. To make sure that your connections are properly placed, please follow these directions:

- *A-band sheath*: it must be connected to the gas injector on the petrol injector (disconnected) through the BLUE and BLUE/BLACK wires of the injector cut-off device.
- *B-band sheath*: it must be connected to the gas injector on the petrol injector (disconnected) through the RED and RED/BLACK wires of the injector cut-off device.
- *C-band sheath*: it must be connected to the gas injector on the petrol injector (disconnected) through the GREEN and GREEN/BLACK wires of the injector cut-off device.
- *D-band sheath*: it must be connected to the gas injector on the petrol injector (disconnected) through the YELLOW and YELLOW/BLACK wires of the injector cut-off device.

Fig. 2.3-1 shows an example of these connections.

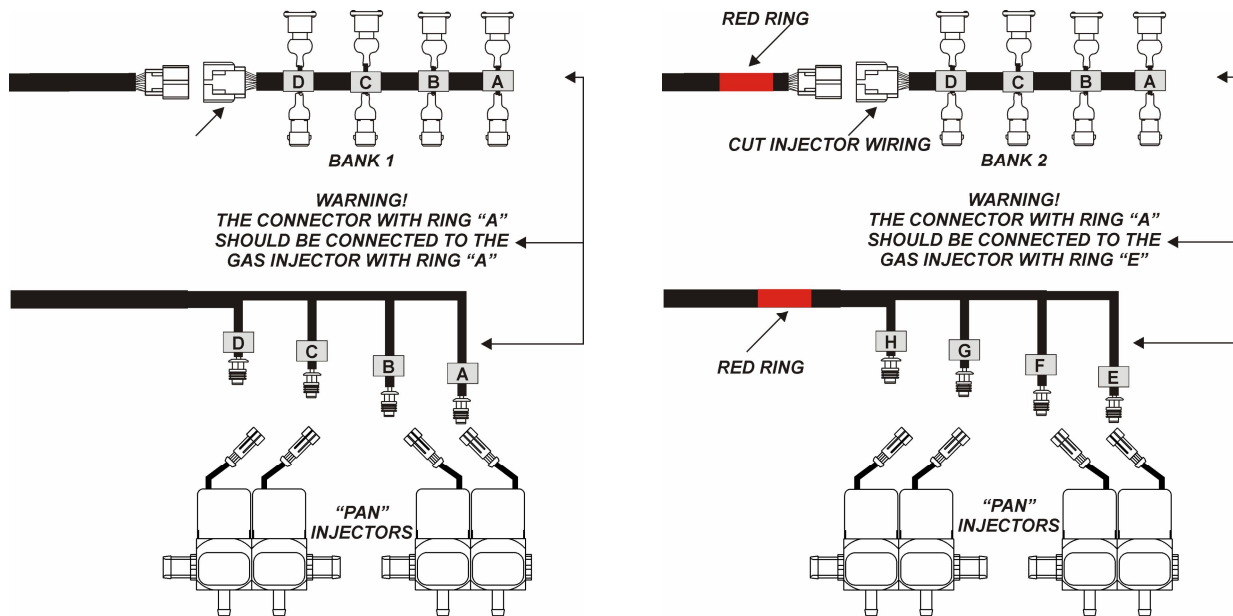


Fig. 2.3-1

### 3. Fine-tuning

This section will guide through the exact procedure to follow for a correct fine-tuning of your gas system. Please follow these directions:

- Always make sure to use the latest version of this software. Please contact the Zavoli Technical Support Center if you have any questions.
- Perform a vehicle configuration, as described in the Technical Manual - Calibration Software for the AliseiN Injection System.
- Make sure to use the latest available version of our firmware (fig. 3.1-1). Please contact the Zavoli Technical Support Center if you have any questions.

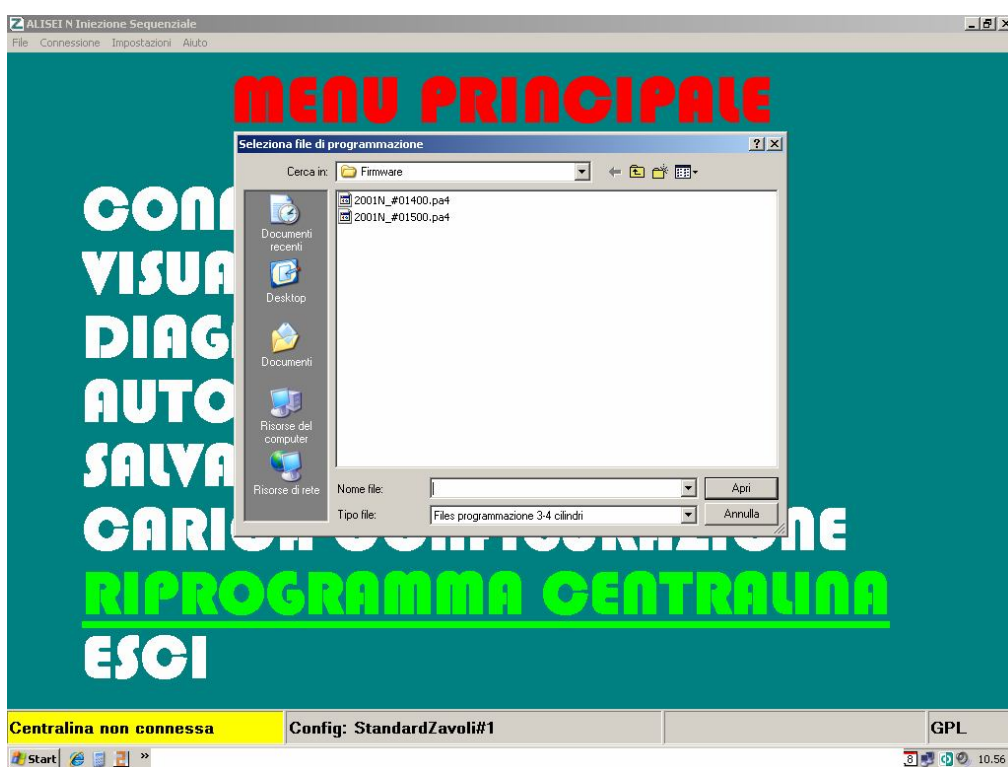


Fig. 3.1-1

- Only use older configuration and firmware files after contacting the Zavoli Technical Support Center.

#### 3.1 Self-Calibration

Before starting the self-calibration procedure, please make sure that the vehicle is in good working conditions when using petrol. The Gas fueling system is based on the vehicle's original Petrol fueling system.

Check points for the Self-Calibration procedure:

- Always make sure that during the process gas injection time does not stop at 3.8ms. If it does, the procedure cannot be successfully completed. Replace the existing “jets” with models of a smaller diameter.
- Make sure that gas injection time fluctuates. If it doesn't, the procedure cannot be successfully completed. Verify the conditions of the Lambda sensor using proper tools.

## 3.2 Map

This menu will allow you to display the “K” multiplication coefficients used by the control unit to determine GAS injection times. By increasing the “K” coefficient, GAS injection times will be increased too, while on the other hand, by decreasing the “K” coefficient, the opposite operation will be performed (fig. 3.2-1).

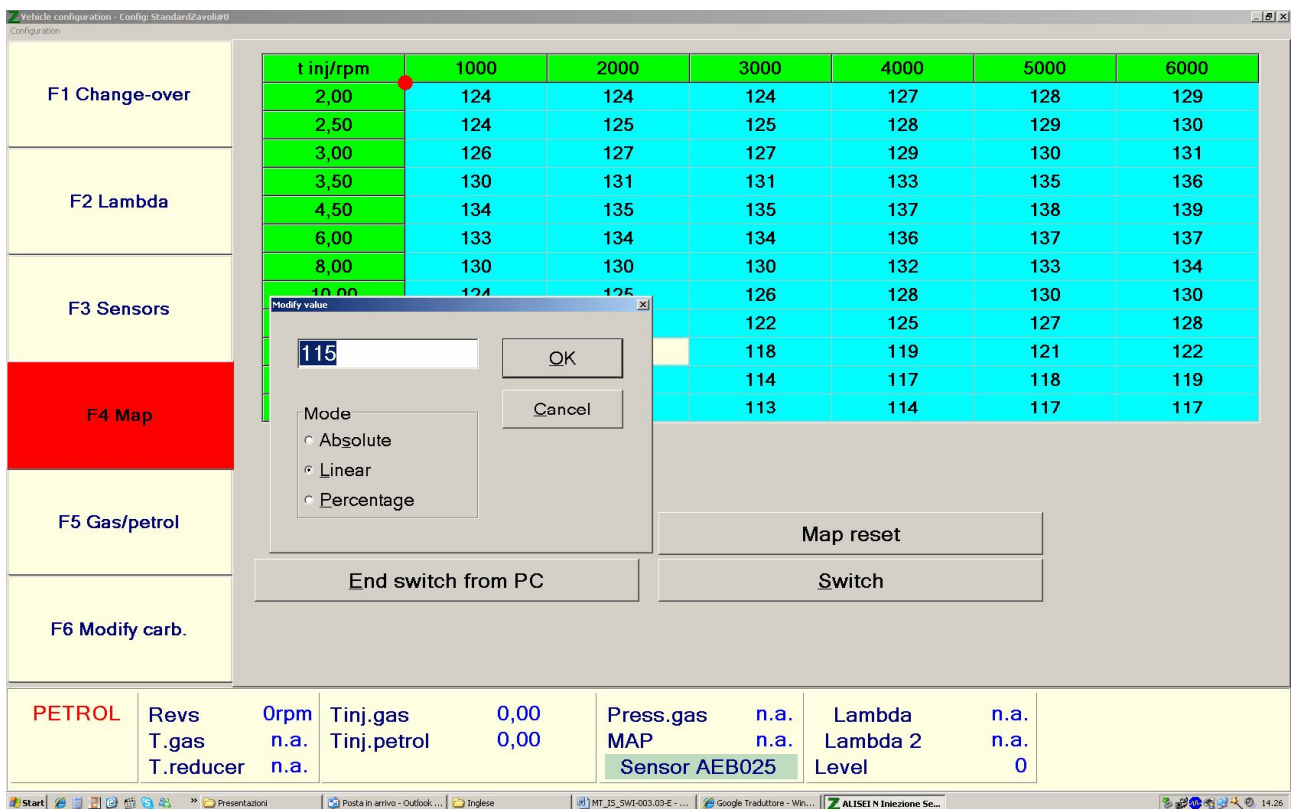


Fig. 3.2-1

### 3.2.1 Carburetion Check

Before checking the carburetion, please make sure that the vehicle is in good working conditions when using petrol. The Gas fueling system is based on the vehicle's original Petrol fueling system. To perform a correct check, please follow these directions:

- Start the vehicle on petrol and wait for the engine to reach its regular operating temperature of about 90°C;
- Select the entire chart, so as to allow for an adjustment of engine idle quality (fig. 3.2.1-1).

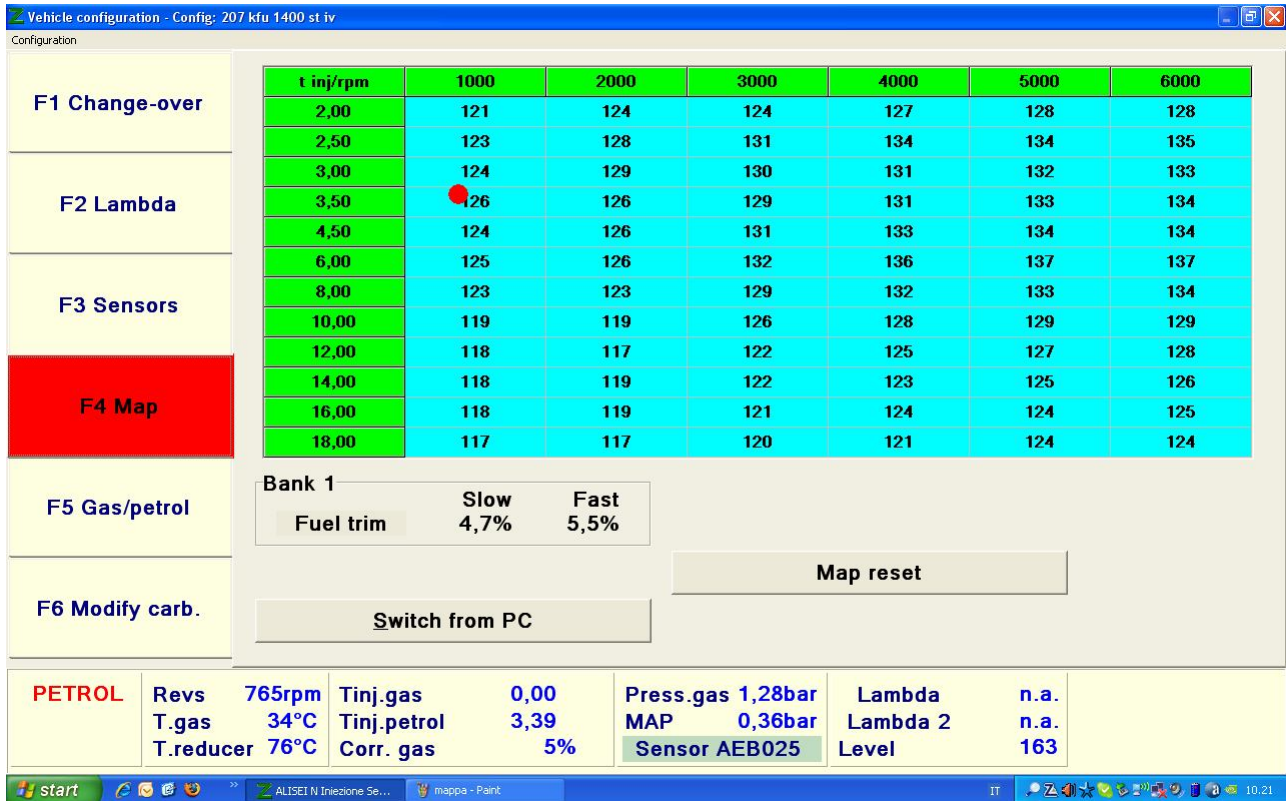
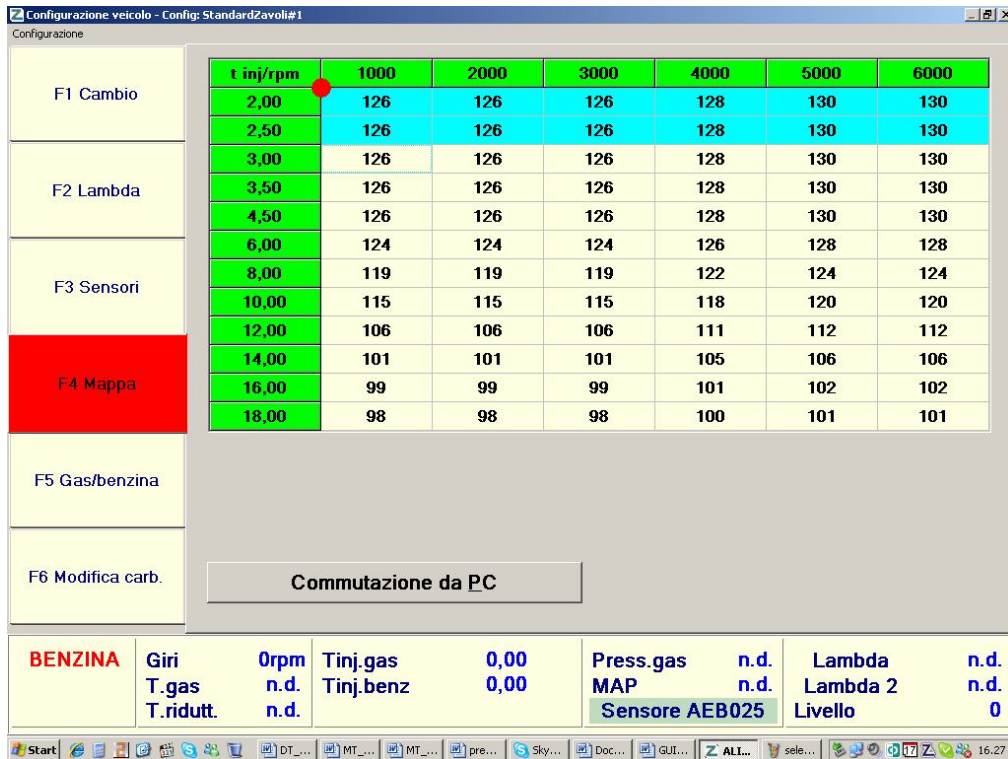


Fig. 3.2.1-1

- Check the integrators/connectors by means of an OBDII palm tester. Make sure that the switch is on Petrol mode, and once the integrators/connectors have reached a stable value, switch to Gas.
- Check the integrators/connectors again.
- If when the vehicle is using gas, the correctors/integrators are 3-4 units higher/lower than when using petrol (ex: they go from 8% to 11-12%), adjust the carburetion. Please remember that:
  - If the correctors/integrators move toward positive numbers, the petrol control unit is detecting poor carburetion. In this case, enter a number similar to the variation of the correctors/integrators in your cell.
  - If the correctors/integrators move toward negative numbers, the petrol control unit is detecting excessive carburetion. In this case, enter a negative number in your cell.
  - After every adjustment, make sure to check that the correctors/integrators are at the same level for both Gas and Petrol.
  - Increase engine load by gradually turning on the lights, the rear window defrost system, the vent, and, if your vehicle is equipped with it, the air conditioning system. The red dot marking injection times should be moving to the cell below.
- Select the area of the chart where the red dot is located – all the way to the bottom (fig. 3.2.1-2) – and check the correctors/integrators one more time.





t inj/rpm	1000	2000	3000	4000	5000	6000
2,00	126	126	126	128	130	130
2,50	126	126	126	128	130	130
3,00	126	126	126	128	130	130
3,50	126	126	126	128	130	130
4,50	126	126	126	128	130	130
6,00	124	124	124	126	128	128
8,00	119	119	119	122	124	124
10,00	115	115	115	118	120	120
12,00	106	106	106	111	112	112
14,00	101	101	101	105	106	106
16,00	99	99	99	101	102	102
18,00	98	98	98	100	101	101

<b>BENZINA</b>	Giri	Orpm	Tinj.gas	0,00	Press.gas	n.d.	Lambda	n.d.
	T.gas	n.d.	Tinj.benz	0,00	MAP	n.d.	Lambda 2	n.d.
	T.ridutt.	n.d.			Sensore AEB025		Livello	0

Fig. 3.2.1-2

- Repeat the procedure so as to cover as many rows as possible in your chart.
- Once you have checked as many idle quality rows as possible, perform an actual road drive test and complete the chart. Check the correctors/integrators one more time.

You will not be able to perform a corrector/integrator check on Euro 2 vehicles (or earlier models). To check the carburetion of these vehicles, simply check their petrol injection time (fig. 3.2.1-3);

<b>Tinj.gas</b>	<b>0,00</b>
<b>Tinj.benz</b>	<b>0,00</b>

Fig. 3.2.1-3

- Select the whole chart, so as to perform an adjustment of the engine idle quality (fig. 3.2.1-1).
- Check injection times when the vehicle is in Petrol mode. Switch to Gas.
- If when the vehicle is using Gas injection times are different from Petrol, adjust the carburetion and remember that:
  - If injection times increase, the petrol control unit is detecting poor carburetion. In this case, enter a higher number in your cell.
  - If injection times decrease, the petrol control unit is detecting excessive carburetion. In this case, enter a lower number in your cell.

- After each adjustment, make sure to check that injection times are at the same level for both Gas and Petrol.
- Increase engine load by gradually turning on the lights, the rear window defrost system, the vent, and, if your vehicle is equipped with it, the air conditioning system. The red dot marking injection times should be moving to the cell below.
- Select the area of the chart where the red dot is located – all the way to the bottom (fig. 3.2.1-2) – and
- repeat the procedure so as to cover as many rows as possible in your chart.
- Once you have checked as many idle quality rows as possible, perform an actual road drive test and complete the chart. Check injection times one more time.

At the end of each carburetion check, always make sure that **K** coefficients in the chart maintain more or less the same value through the various phases of the procedure (see fig. 3.2.1-4). Values are allowed to increase/decrease  $\pm 8$  points between phases (see fig. 3.2.1-5). If they increase/decrease more than 8 points, carburetion is poor and the petrol ECU cannot operate correctly. As a consequence, the engine will perform poorly, too.

3,00	126	126	126	128	130	130
3,50	150	150			150	150
4,50	126	126			130	130
6,00	138	138			138	138
8,00	119	119			124	124

Fig. 3.2.1-4

3,50	126	126	126	128	130	130
4,50	126	126			130	130
6,00	124	124			128	128
8,00	119	119			124	124
10,00	115	115	115	118	120	120

Fig. 3.2.1-5

The new versions will be recognized by the following code on the back of the ECU

- “AEB2001NC” on the ECU 3-4 cylinders.
- “AEB2568D” on the ECU 5-6-8 cylinders.

It will be possible to read compatible the fuel trimmer directly in the "F4 Map".

NB: When you finish the map, going in the "F5" you can enable "ADAPTIVITY." **This feature enabled only completion of the map.**

**The new ECU works with two firmware that are**

- **version 5.6 for ECU 3 -4 cylinders.**
- **Version 3.0 for ECU 5-6-8 cylinders**

It is possible to use the configurations used earlier.

## PRINCIPLE CHARACTERISTICS

- ECU's derived from the actual model with an additional capacity of OBD management communication on the line K or line CAN:
- Same functions of the current ECU with disconnected OBD
- Compatible Pin-out with the current ECU. You need only to add the three wires for the OBD communication.
- Use of a new microprocessor with a higher performance than the one current ECU used but they need a new firmware which is not compatible with the previous one.
- Total compatibility with the current configuration
- New PC software

## FUNCTIONS OF THE ECU WITH CONNECTING WIRES OF THE OBD DRIVE AND COMPATIBLE COMMUNICATION STANDARDS

- Possibility to see the petrol corrections on the interface of the PC
- Possibility to disconnect the adaptability function during the functioning by gas based on the processing of the OBD parameters.

## ADAPTABILITY

- Recovery of mechanical tolerance
- Recovery of repeatability
- Recovery of long term – medium stability
- Capacity of adequate but limited intervention
- Need for a correct mapping (disable adaptability when set up completed)
- Control actual gas (“fast”)
- Control historical gas (“slow”)
- Control of percentage of carburation map
- Medium double base (information obtained from the OBD connection)
- Adaptability to different quality of carburations

## STANDARD OBD CURRENTLY COMPATIBLE AUTOMATIC RECOGNITION TYPE OF CONNECTION.

- ISO9141 K-line pin 7 diagnosis (connection type 1 on the handheld tester)
- KWP-2000 Fast Init K-line pin 7 diagnosis (connection type 2 on the handheld tester)
- KWP-2000 Slow Init K-line pin 7 diagnosis (connection type 3 on the handheld tester)
- CAN standard-250 Kbps CAN-H pin 6, CAN-L pin 14 from the diagnosis drive (connection type 6)
- CAN extended-250 Kbps CAN-H pin 6, CAN-L pin 14 from the diagnosis drive (connection type 7)

- CAN standard-500 Kbps CAN-H pin 6, CAN-L pin 14 from the diagnosis drive (connection type 8)
- CAN extended-500 Kbps CAN-H pin 6, CAN-L pin 14 from the diagnosis drive (connection type 9)

### SUITABILITY

- All the ECU that manage fast INTEGRATORS / slow “normal” (+/- 25%)
- All the ECU that manage fast INTEGRATORS / slow “right”
- In the coming developments on all units compatible with OBD

In next shipments the wires for the OBD connection will not be included with the general cabling. They will have to be supplied separately.

### POSITIONING OF THE CABLES

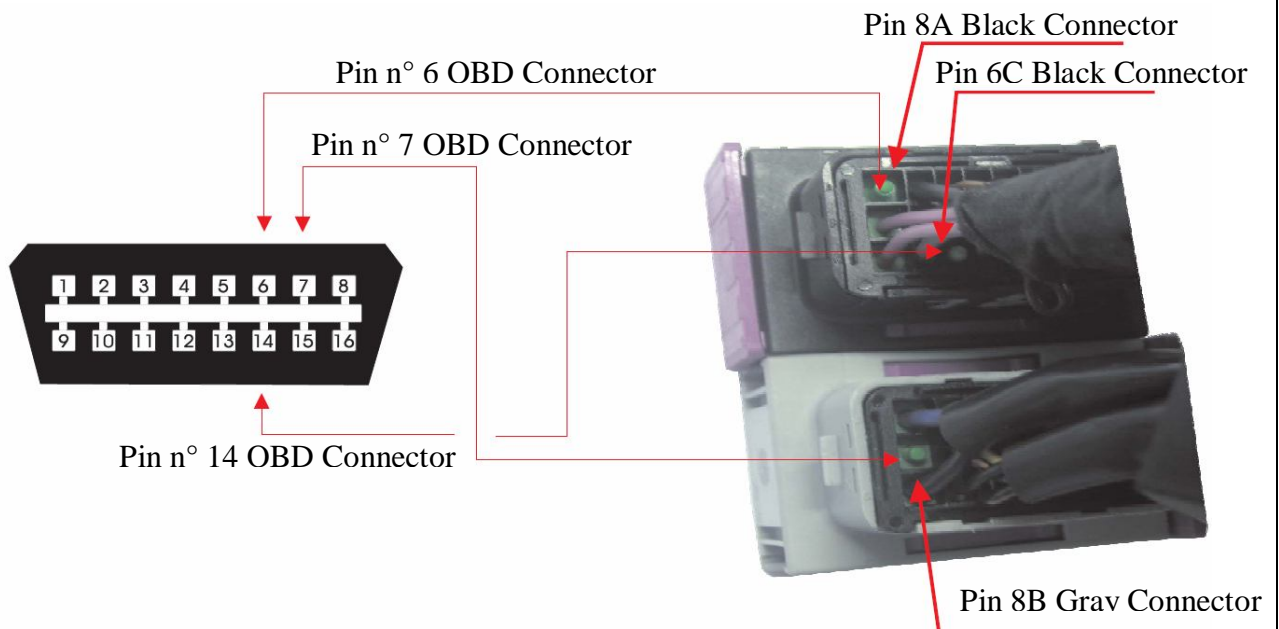
The cables must be inserted in the following PINS

#### 4 CYLINDER ECU

CAN L → Pin 6C from the BLACK connector (yellow-grey wires) → Pin 14 on OBD connector

CAN H → Pin 8A from the BLACK connector (yellow-green wires) → Pin 6 on OBD connector

K-LINE → Pin 8B from the GRAY connector (green wire) → Pin 7 on OBD connector



## 8 CYLINDER ECU

CAN L → Pin 51 from the ECU Gas connector (Yellow-grey wires) → Pin 14 on OBD connector

CAN H → Pin 54 from the ECU Gas connector (Yellow-green wires) → Pin 6 on OBD connector

K-LINE → Pin 52 from the ECU Gas connector (Green wire) → Pin 7 on OBD connector

## CODES OF ADDITIONAL CABLES

For 4 cylinder ECU; **KF2001-OBD**

For 5/6/8/ cylinder ECU; **KF2568-OBD**

#### 4. Available Kits

The AliseiN and Alisei-Mir Kits come in “N” versions (Regular) and “S” versions (Super). You can select the most appropriate kit according to your needs and vehicle specifications.

AliseiN Kit – Description

##### “N” Kit

- In 4-cylindrer vehicles, it can be used at up to 135 Kw.
- In 5-cylindrer vehicles, it can be used at up to 135 Kw.
- In 6-cylindrer vehicles, it can be used at up to 135 Kw.
- In 8-cylindrer vehicles, it can be used at up to 135 Kw.

##### “S” Kit

- In 4-cylindrer vehicles, it can be used at over 135 Kw.
- In 5-cylindrer vehicles, it can be used at over 135 Kw.
- In 6-cylindrer vehicles, it can be used at over 135 Kw.
- In 8-cylindrer vehicles, it can be used at over 135 Kw.

“S” Kits always require the use of larger multi-valves.

If you are using a toroidal tank, move the ring nut so that the suction pipe of the multi-valve faces the rear of the vehicle.

Alisei-Mir Kit – Description:









- Basic 4-cylinder version – up to 100Kw.
- Basic 5-cylinder version – up to 100Kw.
- Basic 6-cylinder version – up to 100Kw.
- Basic 8-cylinder version – up to 100Kw.
- For all vehicles 100Kw and over (4-5-6-8 cylinders) Zavoli s.r.l. produces Kits with 2 regulators.

Alisei-Mir Kit (Meta Reducer)– Description:

- Basic 4-cylinder version – up to 135Kw.
- Basic 5-cylinder version – up to 145Kw.
- Basic 6-cylinder version – up to 162Kw.
- Basic 8-cylinder version – up to 220Kw.

## 5. Calibrated Jets – Sizing Charts







The following chart provides information about the size of calibrated jets for the **Alisei-Zeta Kit**, based on engine power (fig. 5-1).

<b>WARNING</b>					
The ZETA N regulator has a maximum capacity of 150kw The ZETA S regulator has a maximum capacity of 250kw The PAN injector has a maximum capacity of 32kw (per cylinder) The PAN S injector has a maximum capacity of 35kw (per cylinder)					
ZAVOLI SRL ITALY +39 0547 646409 Maximum power supply given in Kw. ALISEI N Sequential Injection System with modular ZAVOLI PAN injectors and ZETA regulator.					<b>TAB. 014.E</b> <b>19.04.07</b>
JETS SPECIFIC COLOR	3 CIL. FROM TO	4 CIL. FROM TO	5 CIL. FROM TO	6 CIL. FROM TO	8 CIL. FROM TO
COD 491 052.01v1 	UP TO 45	UP TO 60	UP TO 75	UP TO 90	UP TO 120
Ø 1.7 ZINC TROPIC COD 491 052.11v1 	45 53	60 70	75 88	90 105	120 140
Ø 1.8 ZINC TROPIC COD 491 052.02v1 	53 60	70 80	88 100	105 120	140 160
Ø 2.0 ZINC WHITE COD 491 052.03v1 	60 68	80 90	100 113	120 135	160 180
Ø 2.2 ZINC WHITE COD 491 052.04v1 	68 75	90 100	113 125	135 150	180 200
Ø 2.4 BRASS NATURAL COD 491 052.05v1 	75 83	100 110	125 138	150 165	200 220
Ø 2.6 BRASS NATURAL COD 491 052.06v1 	83 96	110 128	138 160	165 192	220 250
Ø 3.0 ZINC BLACK 		FROM 128 TO 140 USE PAN S INJECTORS	ZETA REGULATOR REQUIRED FROM 160 TO 175 USE PAN S INJECTORS	ZETA REGULATOR REQUIRED FROM 192 TO 210 USE PAN S INJECTORS	ZETA REGULATOR REQUIRED FROM 250 TO 280 USE PAN S INJECTORS AND TWO ZETA S REGULATORS

THE FIGURES SHOWN IN THIS CHART ARE THE RESULT OF THEORICAL CALCULATIONS. IT IS THEREFORE RECOMMENDED TO TEST THE VEHICLE ON THE ROAD. GAS INJECTION TIME AT IDLE (WITH NO ENGINE LOAD) MUST BE BETWEEN 5 AND 6 MILLISECOND.

Fig. 5-1

The following chart provides information about the size of calibrated jets for the **Alisei-Mir Kit**, based on engine power (fig. 5-2).

<b>WARNING</b>						
THE MIR REGULATOR HAS A MAXIMUM CAPACITY OF 100KW						
THE PAN INJECTOR HAS A MAXIMUM CAPACITY OF 27KW (PER CYLINDER)						
THE PAN S INJECTOR HAS A MAXIMUM CAPACITY OF 30KW (PER CYLINDER)						
ZAVOLI SRL ITALY +39 0547 646409					TAB. 021.E	
MAXIMUM POWER SUPPLY GIVEN IN KW					26.10.07	
ALISEI MIR SEQUENTIAL INJECTION SYSTEM WITH MODULAR ZAVOLI PAN INJECTORS AND MIR REGULATOR.						
JETS SPECIFIC COLOR	3 CIL. FROM TO	4 CIL. FROM TO	5 CIL. FROM TO	6 CIL. FROM TO	8 CIL. FROM TO	
COD 491 052.11v1  GOLA Ø 1.8 ZINC TROPICAL	UP TO 45	UP TO 60	UP TO 75	UP TO 90	UP TO 120	2 MIR REGULATORS REQUIRED
COD 491 052.02v1  Ø 2.0 ZINC WHITE	45 53	60 70	75 88	90 105	120 140	2 MIR REGULATORS REQUIRED
COD 491 052.03v1  GOLA Ø 2.2 ZINC WHITE	53 60	70 80	88 100	105 120	140 160	2 MIR REGULATORS REQUIRED
COD 491 052.04v1  Ø 2.4 BRASS NATURAL	60 68	80 90	100 113	120 135	160 180	2 MIR REGULATORS REQUIRED
COD 491 052.05v1  GOLA Ø 2.6 BRASS NATURAL	68 75	90 100	113 125	135 150	180 200	2 MIR REGULATORS REQUIRED
COD 491 052.06v1  Ø 3.0 ZINC BLACK	75 81 FROM 81 TO 90 USE PAN S INJECTORS	100 108 FROM 108 TO 120 USE PAN S INJECTORS	125 135 FROM 135 TO 150 USE PAN S INJECTORS	150 162 FROM 162 TO 180 USE PAN S INJECTORS	N/A	

THE FIGURES SHOWN IN THIS CHART ARE THE RESULT OF THEORETICAL CALCULATIONS. IT IS THEREFORE RECOMMENDED TO TEST THE VEHICLE ON THE ROAD. GAS INJECTION TIME AT IDLE (WITH NO ENGINE LOAD) MUST BE BETWEEN 5 AND 6 MILLISECONDS.

Fig. 5-2



The following chart provides information about the size of calibrated jets for the **Alisei-Mir Kit (Meta Reducer)**, based on engine power (fig. 5-3).

## WARNING

THE META REGULATOR HAS A MAXIMUM CAPACITY OF 250KW

THE PAN INJECTOR HAS A MAXIMUM CAPACITY OF 27KW (PER CYLINDER

)  
THE PAN S INJECTOR HAS A MAXIMUM CAPACITY OF 30KW (PER CYLINDER)

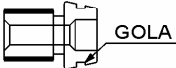

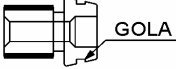

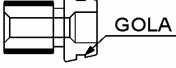

ZAVOLI SRL ITALY +39 0547 646409

MAXIMUM POWER SUPPLY GIVEN IN KW

ALISEI MIR SEQUENTIAL INJECTION SYSTEM

WITH MODULAR ZAVOLI PAN INJECTORS AND META REGULATOR.

TAB. 022.E  
26.01.09

JETS SPECIFIC COLOR	3 CIL.		4 CIL.		5 CIL.		6 CIL.		8 CIL.	
	FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO
COD 491052.11v1  GOLA Ø 1.8 ZINC TROPICAL	UP TO	45	UP TO	60	UP TO	75	UP TO	90	UP TO	120
COD 491052.02v1  Ø 2.0 ZINC WHITE	45	53	60	70	75	88	90	105	120	140
COD 491052.03v1  GOLA Ø 2.2 ZINC WHITE	53	60	70	80	88	100	105	120	140	160
COD 491052.04v1  Ø 2.4 BRASS NATURAL	60	68	80	90	100	113	120	135	160	180
COD 491052.05v1  GOLA Ø 2.6 BRASS NATURAL	68	75	90	100	113	125	135	150	180	200
COD 491052.06v1  Ø 3.0 ZINC BLACK	75	81	100	135	125	145	150	162	200	220
	FROM 81 TO 90 USE PAN S INJECTORS		FROM 108 TO 120 USE PAN S INJECTORS		FROM 135 TO 150 USE PAN S INJECTORS		FROM 162 TO 180 USE PAN S INJECTORS		FROM 220 TO 250 USE PAN S INJECTORS	

THE FIGURES SHOWN IN THIS CHART ARE THE RESULT OF THEORETICAL CALCULATIONS. IT IS THEREFORE RECOMMENDED TO TEST THE VEHICLE ON THE ROAD. GAS INJECTION TIME AT IDLE (WITH NO ENGINE LOAD) MUST BE BETWEEN 5 AND 6 MILLISECOND.

Fig. 5-2