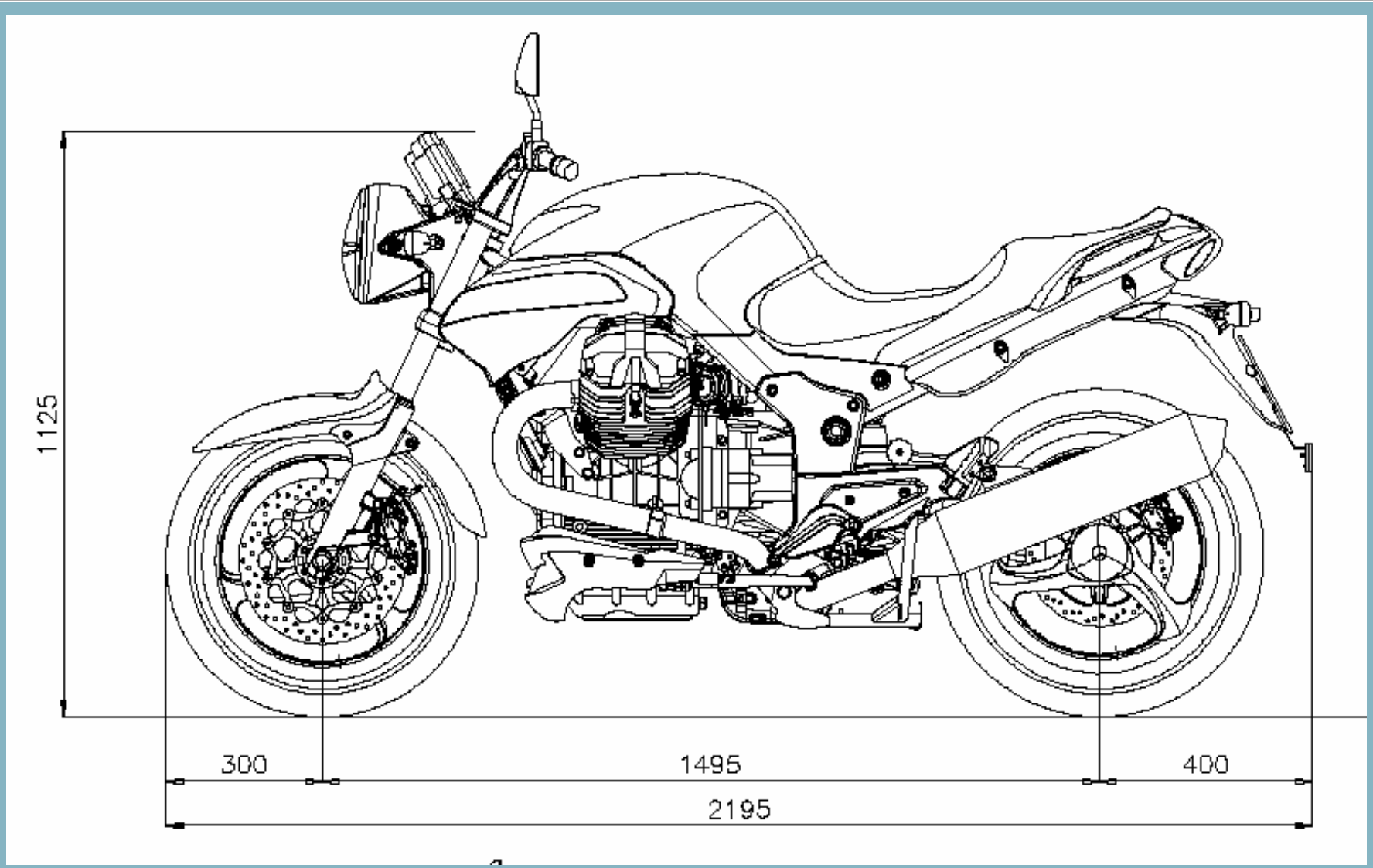
Contents

Breva 1100

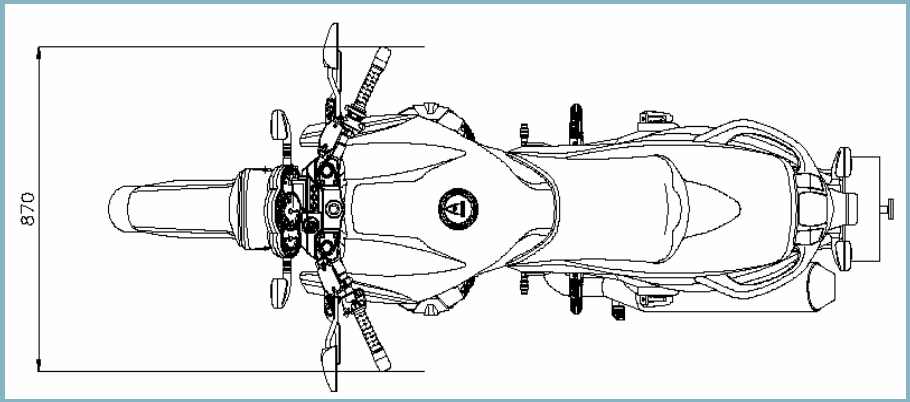
- Aspects and vehicle characteristics
- General data
- Dashboard and immobilizer
- Electronic injection, description and functioning
- Engine
- New electro-mechanical components
- Diagnosis - Axone
- Balancing throttle bodies

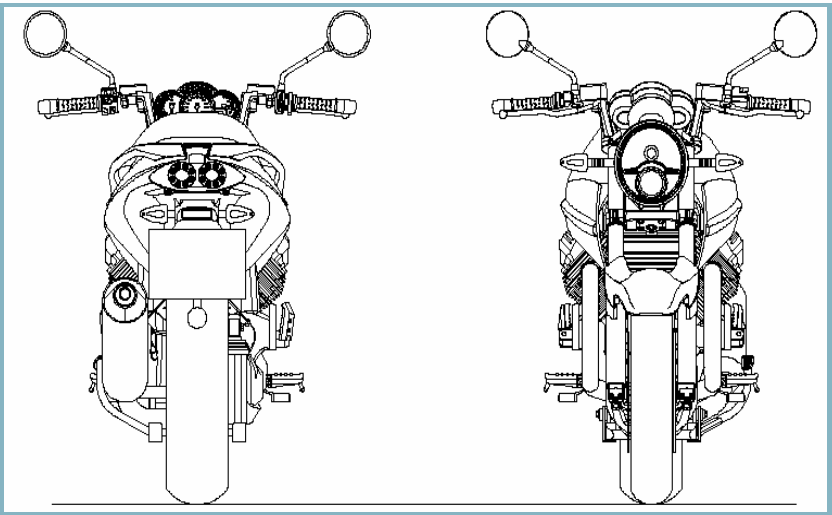
Aspect and vehicle characteristics



Aspect and vehicle characteristics

Total view of vehicle : dimensions





Aspect and vehicle characteristics

General data

Weight: 248 Kg

Output: max. KW 63,0 at 7500 rpm
Torque: Nm 85,0 a 6800 rpm
Maximum speed in 6th gear 210 Km/h

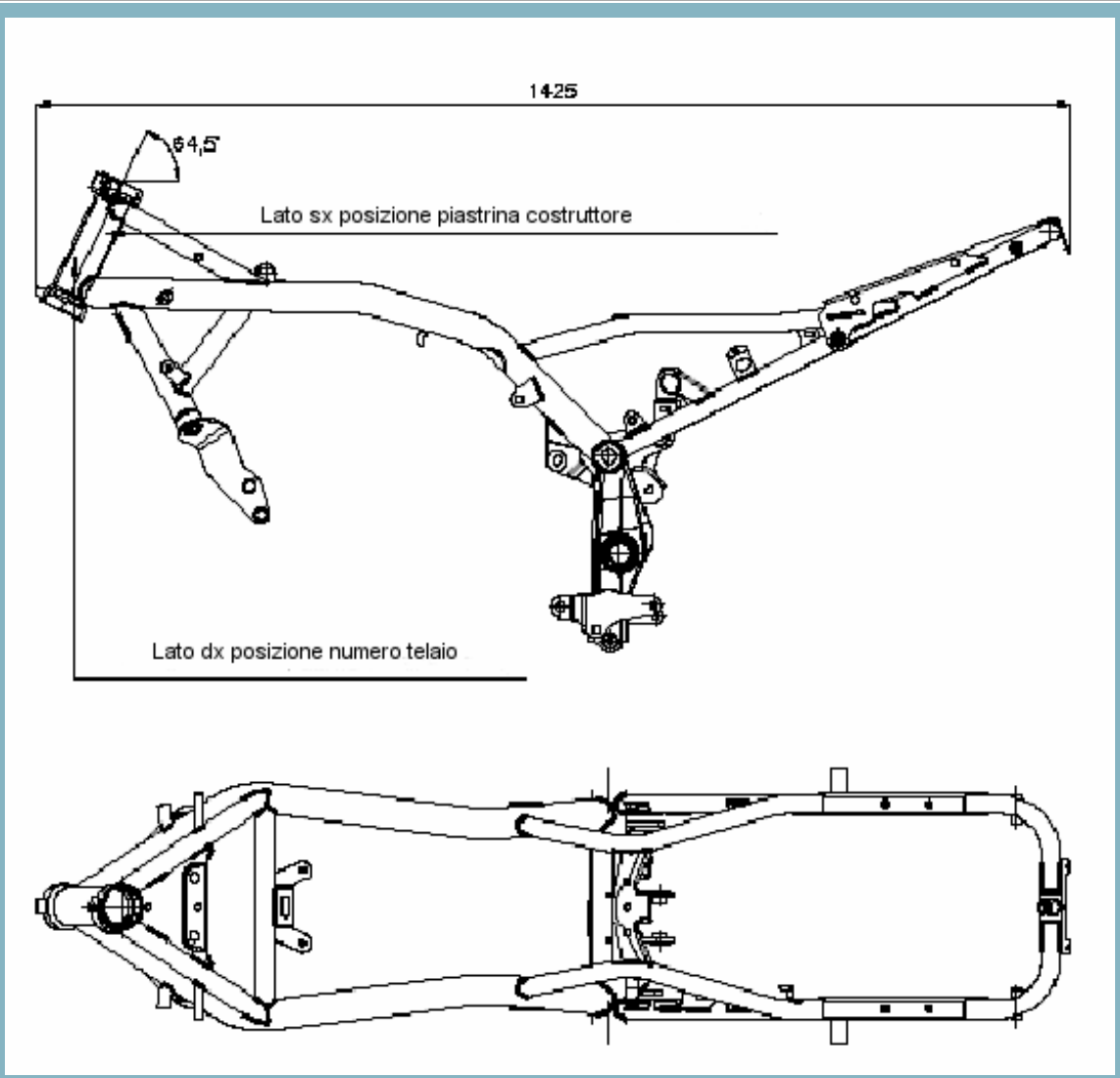
Front tire: 120/70 ZR17 (58W) pressure 1/2 persons 250kPa±10
Rear tire: 180/55 ZR17 (73W) pressure 1/2 persons 280kPa±10

Injection/ignition system MAGNETI MARELLI
Computer IAW 5AM2 with map alfa/n

Aspect and vehicle characteristics

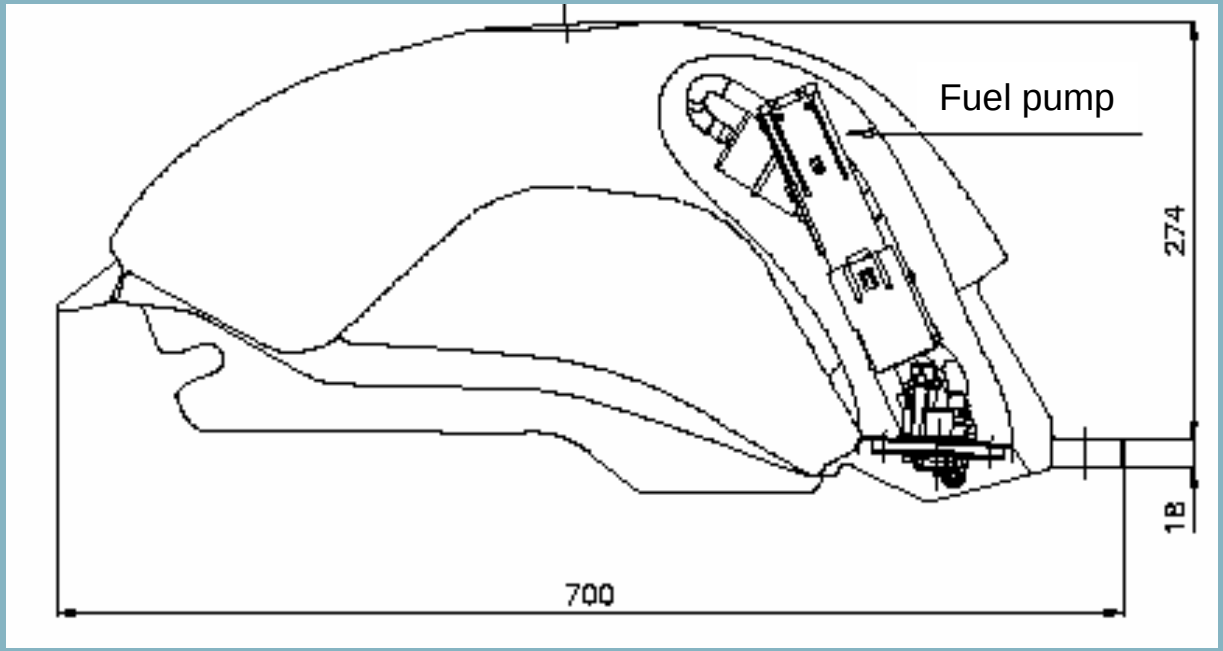
Frame

ZGULP...



Aspect and vehicle characteristics

Fuel tank

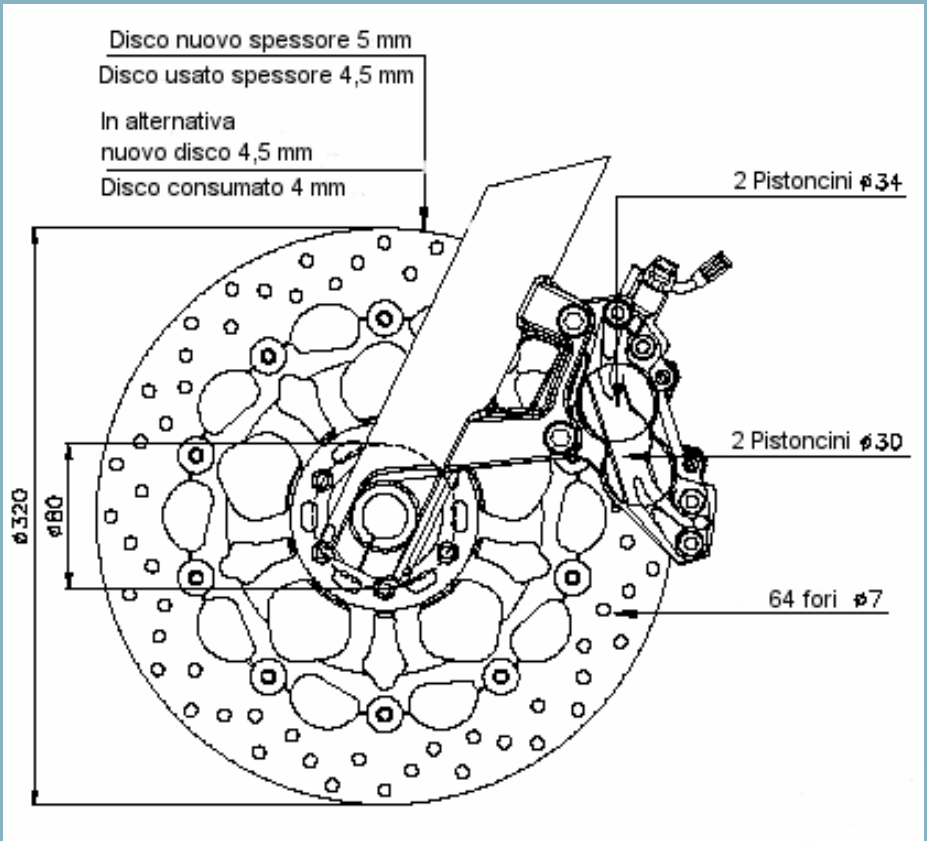


Capacity	**23 l ± 0,5 l**
Material	**Nylon**

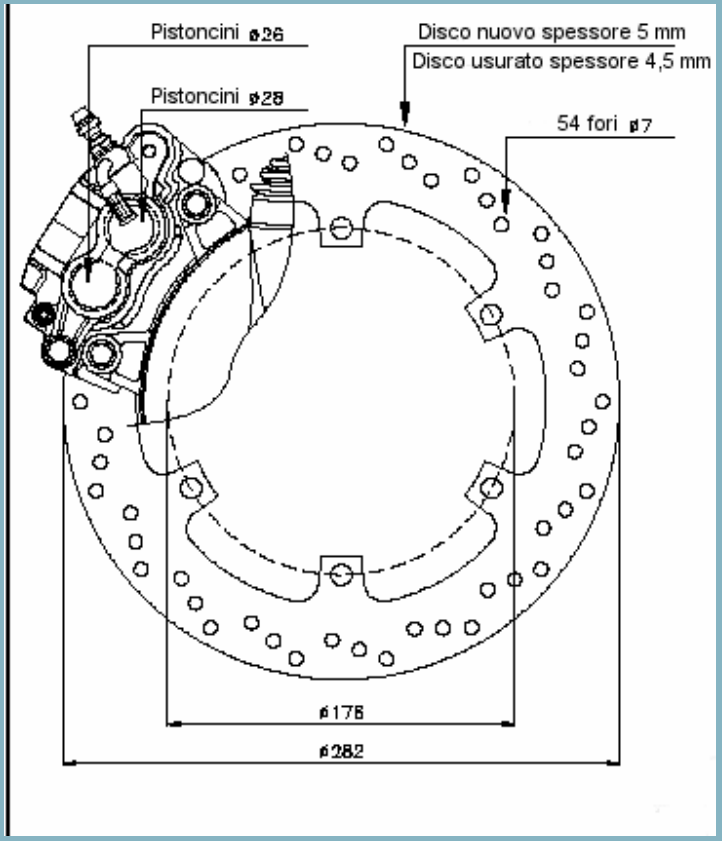
Aspect and vehicle characteristics

Front brakes

Double calipers and discs



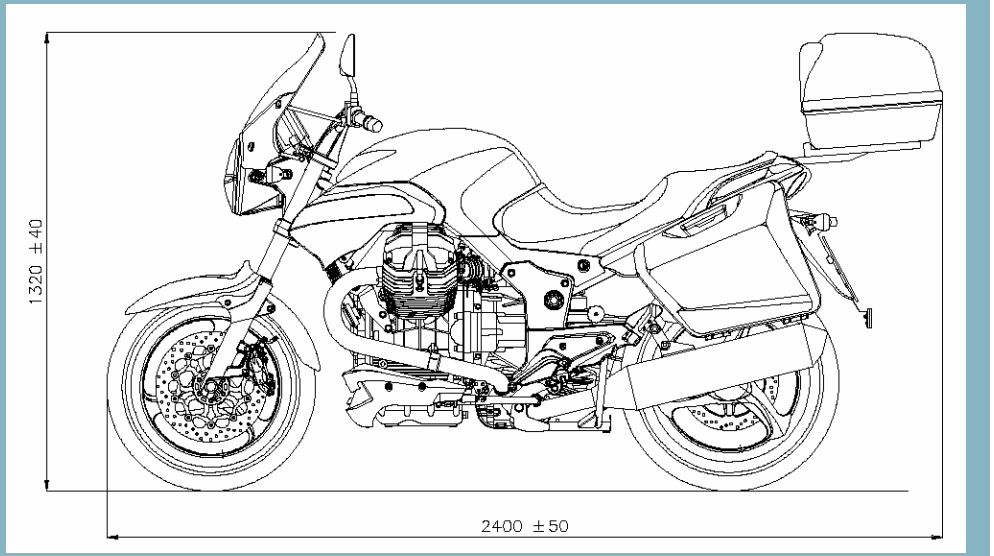
Rear brakes

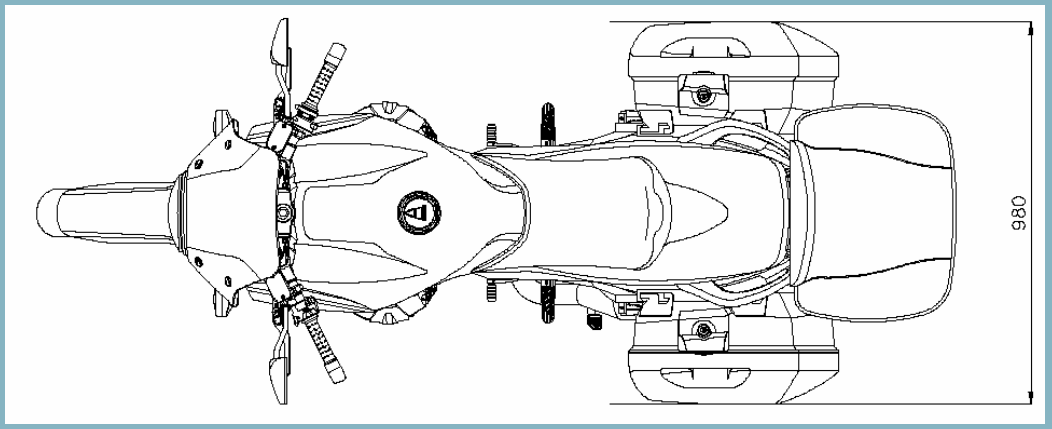


Aspect and vehicle characteristics

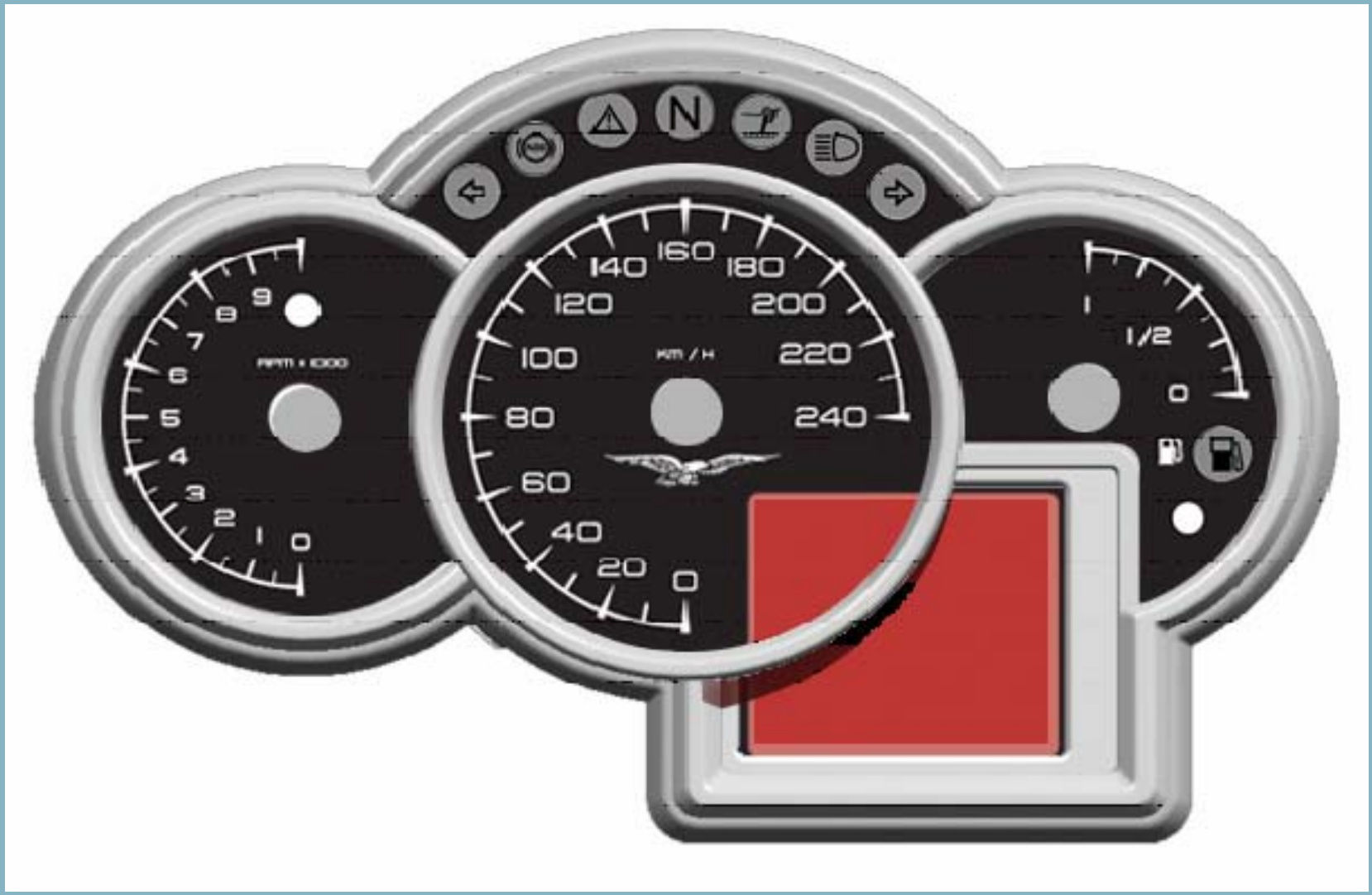
Additional equipment.

Accessories (optional):
- **Windscreen;**
- **Carrying Case adjustable in height;**
- **Side bags**
- **Alarm systems (not yet available)**

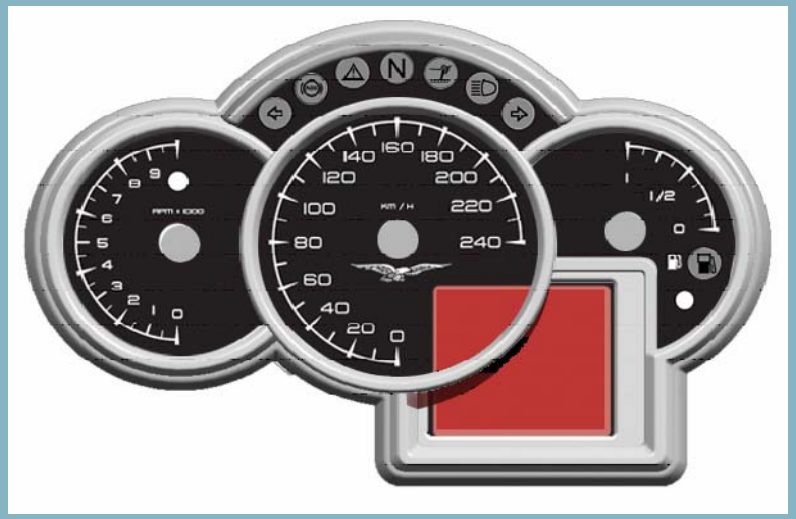




Dashboard



Dashboard : identifying areas



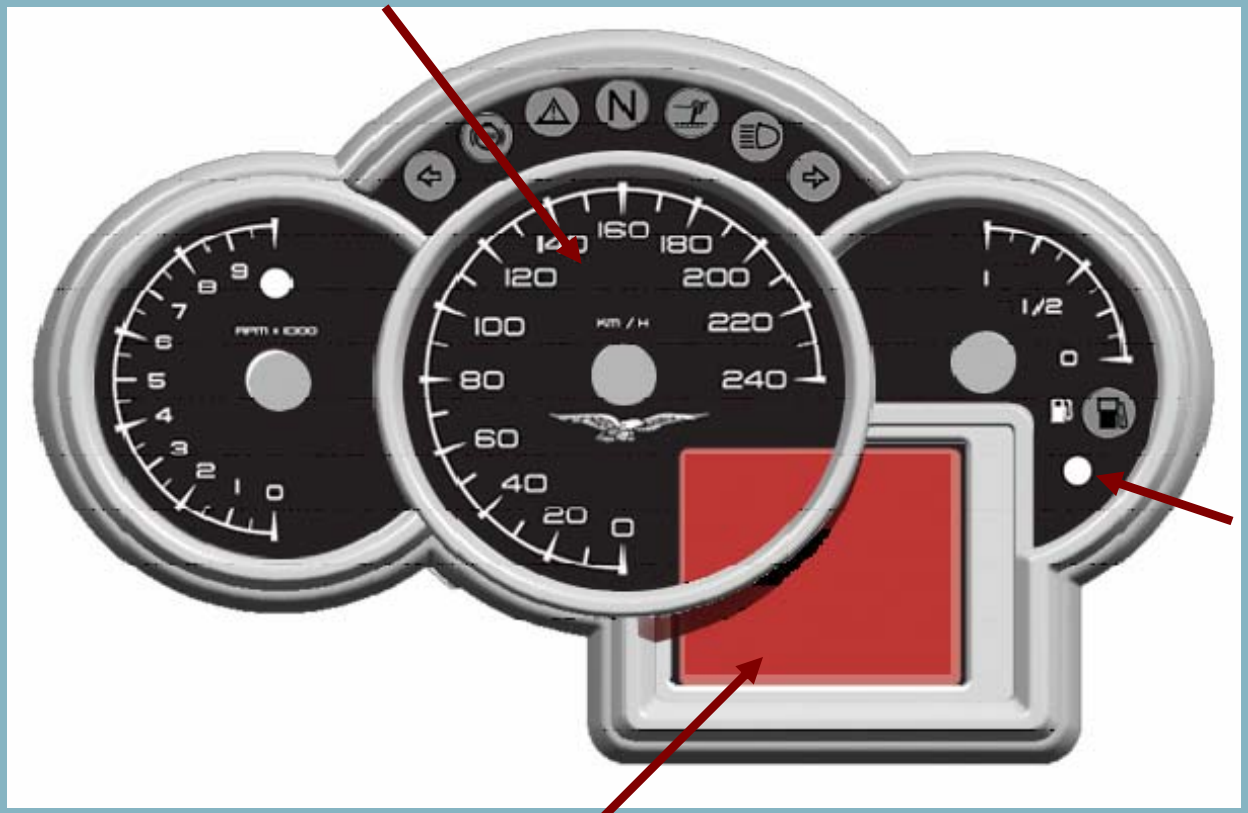
Rev counter:

Positioned at the left, final range 10.000 rpm.

At the end of the scale is a red warning light (Led) without monogram to indicate to shift gear when surpassing a preset level rpm. The rpm activation level can be adjusted via the users interface.

Dashboard : identifying areas

Speedometer at the center



Fuel level indicator **Under the fuel warning light sits a red warning light without pictogram (Led) for the eventual alarm system.**

Multifunctional Display

Dashboard : identifying areas

Fuel level indicator

The dashboard is connected to a variable resistor. Measurements that fall out of the normal operating range are considered as faults and are signalled by the diagnostics. The indications show at the instrument panel at the right and the spare indicator underneath.
The characteristics and measurement curve can be found in the repair manual.

	Quantity	LITRES	OHM
•	8/8	22.50	10-20 appr.
•	4/8	11.25	100 appr.
•	0	0	250-300 appr.

The spare indicator lights up at values higher than 230 ohm

After 2 km it shows the amount of km driven after the indicator light came on.

Dashboard : identifying areas

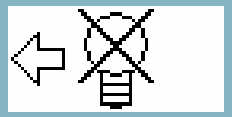
Led indicators

From left to right:
- **Indicator green, left hand indicator**
- **Indicator orange, ABS faulty (CURRENTLY NOT ACTIVE)**
- **Indicator red, Alarm: engine oil pressure problem, EFI and w/ vehicle OFF indicator immobilizer.**
- **Indicator green, Neutral position**
- **Indicator yellow, vehicle stand down**
- **Indicator blue, beam lights on**
- **Indicator green, right hand indicator**

Dashboard: indicators and lights

Direction indicators.

- **The dashboards controls the indicator lights, as well for the single indications left and right as for the combined circuits for the “Hazard” function.**
- **Indications for problems with circuits (bulb burnt or short circuited) by doubling the flashing frequency of the warning light and with indication on the dashboard left or right**



Activation/deactivation of the Hazard function

This function can only be activated or deactivated with the key in ON position

Control of beam lights

The light relay will only be operated by the engine ECU when the rpm exceeds 800

Dashboard: selections

The commands to move between various dashboards functions are obtained by a three position selector at the light switch at the left hand steering handle.

The selector has following three positions:

- **Trip 1**
- **Trip 2**
- **Mode**

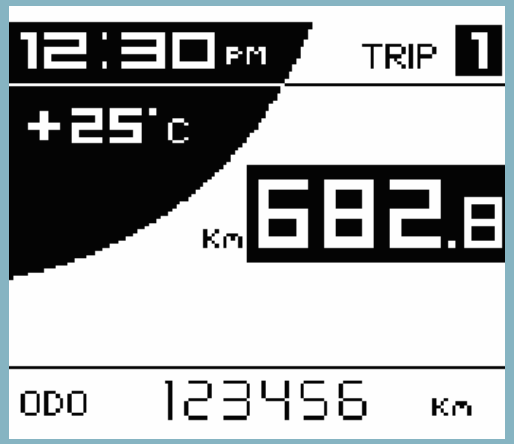
In the first position will show the data of TRIP1,
In the second the data of TRIP2
While in the third position MODE, one can access to the functions of dashboard configurations.

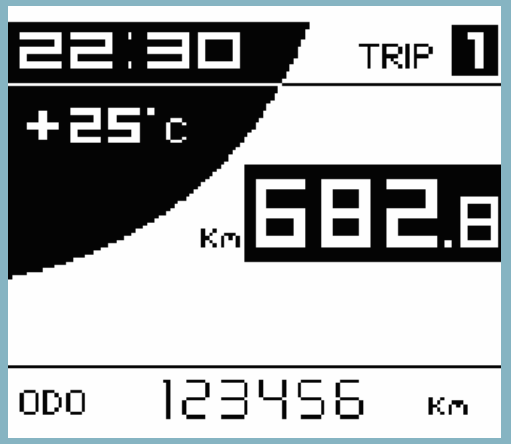
Dashboard: display

Basic information

- On the display appear as well the basic information as the information activated by the selector position. These are:
- Clock. Clock settings can be 12 or 24 hour indications, where 12 hour indications show AM or PM.
- Odometer. A 6 digit number in km or miles, according to user selection.
- Ambient temperature. Shows in the upper left corner of the LCD. When the temperature is close to zero, a icing symbol will show (next slide). Finally one can show the temperature in °C or °F selectable by the user.

Clock Display

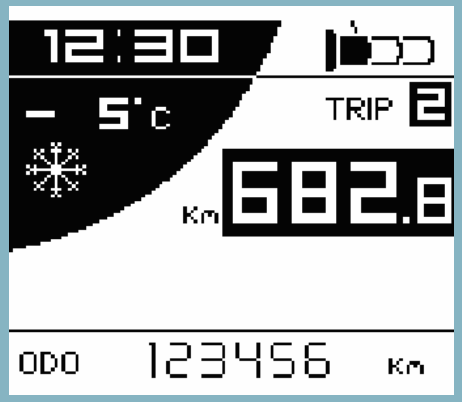


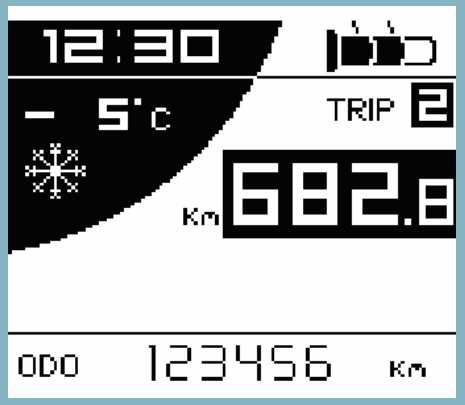


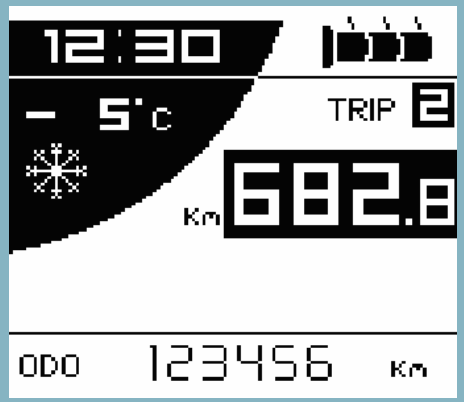
Dashboard: display

Handles heater (OPTIONAL)

With engine running, by pressing insisting at command handles heating, an icon will show at the display that substitutes the selected trip indication. That will be transferred to the central part of the display. With every short pulse a three positions bar will grow indicating the power level present in the handles heating. When the engine is stopped the heater will be switched off. At the next vehicle usage the handles heater will reposition at the ultimate setting.







Dashboard: immobilizer

- ➔ **The immobilizer system is integrated in the electronic dashboard.**
- ➔ **At key-to-ON the dashboard will read the key code. If the code corresponds to the one memorized, the dashboard will activate the initial check and will allow the ECU for engine starting, via the CAN Bus line.**
- ➔ **If the key code is not recognized, the dashboard will not permit for engine starting and on the display will appear the request to insert the code to allow for "manually" engine starting.**
- ➔ **To the customer will be delivered two keys with transponder, already memorized from the factory and at every key-to-ON the dashboard will ask to insert the personal 5 digit code, if not yet done:**

  you must remember to insert the user code

- ➔ **To insert the personal code one must select the function CODE MODIFICATION**

Dashboard : display

Trip 1-2

In these two positions of the display are demonstrated the data relevant for trips 1 and 2.

In the central area is constantly displayed the partial distance covered while in the lower portion the following data will be shown in rotation:

- **Trip time**
- **Average Fuel consumption of the trip**
- **Current consumption**
- **Maximum speed**
- **Average speed**

A short pulse will change the indications between one and the other, keeping the switch pressed longer will reset all values to zero for the selected trip.

Consumption is expressed in litres per 100 kilometres or in miles per gallon

For detailed functioning please read with attention the workshop manual information.

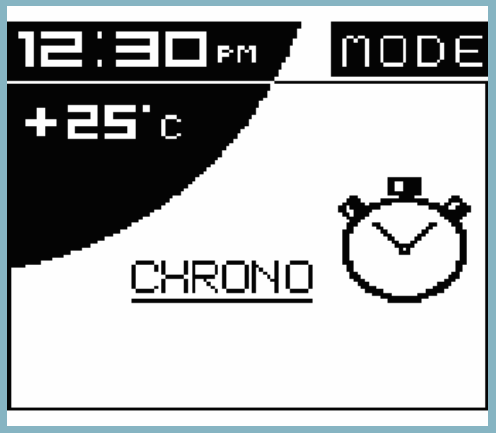
Dashboard : MODE

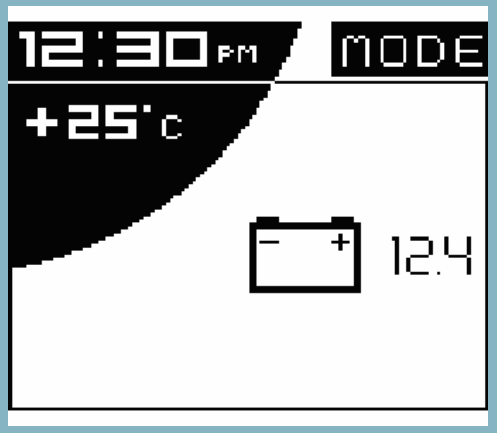
Mode

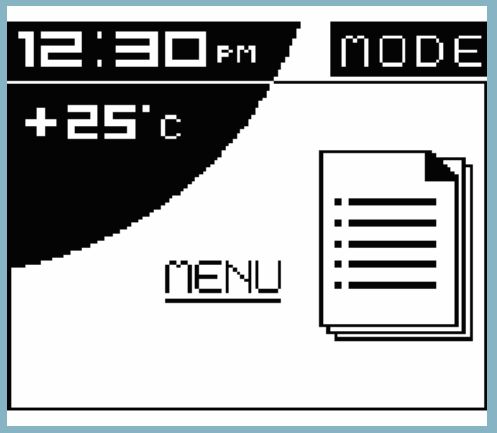
in this position you can select the other functions of the dashboard with the vehicle stopped and thus with speed equal to Zero with every short pulse of the switch SET you can see in sequence the following functions:

stopwatch **battery voltage** **Menu**

The selection of the functions is affected by holding the SET switch for a longer period.







For detailed functioning of the stopwatch please read with attention the workshop manual

Dashboard :Menu

Access to this function is only possible with the vehicle stopped .The graphic of this menu is as follows:

To move your selection down-wards,a short pulse of the switch is sufficient

Pressing the switch down for longer gives the confirmation of your selection of the relative item.

Dashboard : Settings

SETTINGS

When the settings menu is selected, which can also be done by the driver or bike owner, a drop-down menu shows:

Exit

Adjust Clock

Change gear shift rpm

°C/°F

12H/24/

Led immobiliser (turn off when installing the optional alarm system)

Change code

Recover code

For detailed functioning please read with attention the workshop manuals

Dashboard : Settings

Change CODE

In case one remembers its own code is sufficient to insert it and in sequence we will insert the new code which will automatically be memorised.
In case of a new vehicle the user code is: 00000

Recover CODE

In case one does not remember it own code and wishes to modify it, it is requested to insert the two keys that are memorised. The first one is already inserted and therefore it is requested to insert the second key with the message: INSERT 2ND KEY

If the second key is not inserted within 20 seconds the operation will terminate.

After its recognition it will be requested to insert a new code with the message: INSERT THE NEW CODE

At the end of the operation the dashboard will return to the menu Settings.

Dashboard: DIAGNOSTICS

DIAGNOSTICS

To enter in this menu, that will operate on the diagnostic functions and therefore the access is reserved to the *technical assistance*, a code is requested.

Appears the text: INSERT SERVICE CODE

For the Breva 1100 this is: 36421

The functions in this menu are:

Exit

Faults ECU

Faults dashboard

Cancel Fault codes

Reset Service

Update

Change keys

Dashboard : DIAGNOSTICS

FAULTS ECU. The dashboard receives from the central computer only actual faults

Description	Error code
Error throttle valve C.C. Vcc	ECU 10
Error throttle valve C.C. Gnd	ECU 11
Error Engine temperature C.C. Vcc	ECU 14
Error Engine temperature C.C Gnd	ECU 15
Error Air temperature C.C. Vcc	ECU 16
Error Air temperature C.C Gnd	ECU 17
Error Low battery	ECU 20
Error Lambda sensor	ECU 21
Error Ignition coil 1 C.C. Vcc	ECU 22
Error Ignition coil 1 C.C. Gnd	ECU 23
Error Ignition coil 2 C.C. Vcc	ECU 24
Error Ignition coil 2 C.C. Gnd	ECU 25
Error Injector 1 C.C. Vcc.	ECU 26
Error Injector 1 C.C. Gnd	ECU 27
Error Injector 2 C.C. Vcc	ECU 30
Error Pump relay	ECU 36

Dashboard : DIAGNOSTICS

FAULTS ECU. The dashboard receives from the central computer only actual faults

Description	Error code
Error Local Loop-back	ECU 37
Error relay starter C.C. Vcc	ECU 44
Error relay starter C.C. ground	ECU 45
Error cannister C.C Vcc	ECU 46
Error cannister C.C. ground	ECU 47
Error battery high	ECU 50
Error ECU general	ECU 51
Error instrument panel	ECU 54
Error autoadaptation Tito I	ECU 55
Error vehicle speed	ECU 56
Error stepper C.A.	ECU 60
Error stepper C.C. Vcc	ECU 61
Error stepper C.C. Ground	ECU 62
Error unknown	ECU 00

Dashboard : DIAGNOSTICS

DASHBOARD ERRORS

In this mode a table lists eventual mistakes of the immobiliser and its connected sensors.

The error codes are explained as follows

Description	Error code
Immobiliser fault: key code read but not recognised	DSB 01
Immobiliser fault: key code not read (key not present or transponder broken)	DSB 02
Immobiliser fault: Antenna broken (open or short-circuit)	DSB 03
Immobiliser fault: internal controller fault	DSB 04
Fuel sensor fault	DSB 05
Air temperature sensor fault	DSB 06
Oil sensor fault	DSB 07
Oil pressure fault	DSB 08

The dashboard maintains memory of old errors.

Dashboard : DIAGNOSTICS

CANCEL ERRORS

With this option only dashboard faults are erased. A final confirmation will be requested.

Reset service

This function allows to reset the service interval indicator. For the end of line testing purposes this operation also has the possibility for one time only to set the odometer to zero if done within the first 200 kilometers

DIAGNOSIS DSAHBOARD

Update

This function allows to reprogram the dashboard with new software via Axone.

On the display appears: *"dashboard disconnected".it is now possible to connect the diagnostic tool ;* the dashboard will be reconnected normally after a key OFF/ON operation

Currently there is no new software

The white connector is underneath the saddle besides the fuse box close to the diagnostic connector of the injection system.

To connect Axone it is necessary to use the connector Ditech which is present at the confection of Axone 2000 Aprilia-Moto Guzzi

Dashboard : DIAGNOSTICS

Function MODIFY KEYS

➔ **This function can be used:**
1) in case of key loss, the dealer can cancel the lost key
2) to activate up to 4 keys
3) if necessary use a new key ignition lock and memorise a new set of keys.

in the first phase it is requested to insert the user code and after giving confirmation that the key is memorised (1st key), it is requested to insert the other keys .
The procedure ends after four keys are memorised or after 20 seconds

Dashboard : DIAGNOSTICS

Function CHANGE KEYS

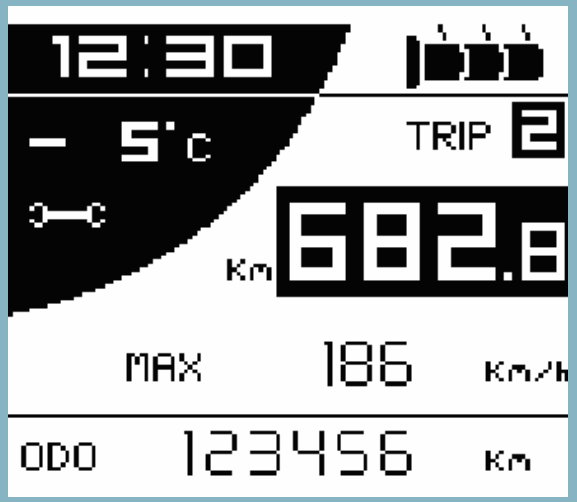
- ➔ In case of the use of a new ignition key set, details of the procedure are as follows:
- ➔ Once turned the key to ON the dashboard not recognising the key will ask for the user code: insert the user code.

- ➔ At this point one can enter in MENU, DIAGNOSIS(inserting the service code) CHANGE KEYS and start the procedure of memorising the new keys.

Dashboard : DIAGNOSTICS

Indication of service interval
When nearing service interval mileage a small wrench will appear in the display. This will be at the same position as the ice symbol.
This indicator can be reset starting 300 kilometers prior to the service interval, in this 300 kilometer range the indicator will normally blink five seconds and then go off.

First time showing at 1500 kilometers, following activation every 10.000 kilometer



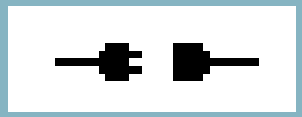
Dashboard : visualise warnings

The dashboard shows to the driver in the lower portion of its display the following alarms by keeping the red warning light on:

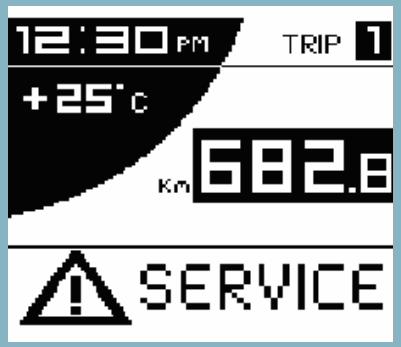
Oil level

Errors from computer or dashboard

Communication faults with the ECU



example:



Dashboard: DIAGNOSTICS

Engine oil sensor faults

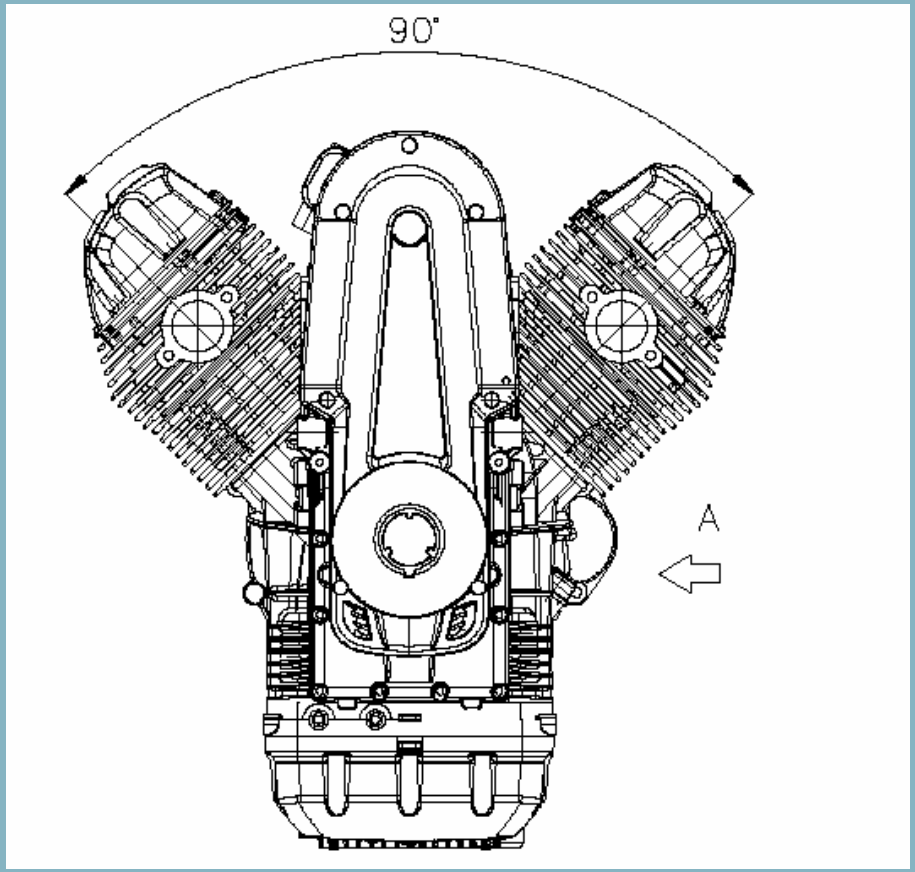
The dashboard will reveal oil pressure faults as well as sensor faults. The oil sensor fault is detected with engine stopped and key in on position, if the sensor is not conducting (open circuit). This fault is indicated by lightening the warning *"service"* that will remain lit also with engine running

Abnormal oil pressure is indicated with engine running at an rpm higher than 2000 rpm and the sensor conducting (shorted). In this case the fault is indicated by lightning the icon *"oilcan".*
In both cases codes are stored in the diagnostic memory of the dashboard

Dashboard : connections

PIN	SERVIZIO	PIN	SERVIZIO
1	+KEY	11	+BATTERY
2	COMAND RH INDICATOR	12	COMAND LH INDICATOR
3	OIL SENSOR	13	RESET INDICATORI/LED ANTITHEFT
4	BEAM LIGHTS IN	14	HAZARD
5	-	15	LED ANTI THEFT (if connected)
6	SELECT 1	16	SELECT 3
7	SELECT 2	17	SENSOR GROUND
8	FUEL LEVEL SENSOR	18	GENERAL GROUND
9	AIR TEMPERATURE SENSOR	19	GENERAL GROUND
10	-	20	GENERAL GROUND
PIN	**SERVICE**	**PIN**	**SERVICE**
21	+ BATTERY	31	-
22	+ BATTERY	32	-
23	ACTIVATE RELAY BEAM LIGHTS	33	-
24	-	34	ACTIVATION INDICATOR REAR.RH
25	COMMAND HANDLE HEATER	35	ACTIVATION INDICATOR FRONT.RH
26	CAN L	36	ACTIVATION INDICATOR REAR.LH
27	CAN H	37	ACTIVATION INDICATOR FRONT.LH
28	K-LINE	38	ACTIVATION HANDLE HEATER LH
29	-	39	ACTIVATION HANDLE HEATER RH
30	ANTENNA 1	40	ANTENNA 2

Engine



Engine: principle characteristics

Max output. KW 63,0 at 7500 rpm
Torque: Nm 85,0 at 6800 rpm

Idle speed: 1100 ± 100 giri/min

Intake valve lift: 10,74 mm
Exhaust valve lift: 10,74 mm
Gap (clearance) intake valve 0,15 ± 0,02 (inspect at 1000 km and every 10.000 km)
Gap (clearance) exhaust valve 0,2 ± 0,02 (inspect at 1000 km and every 10.000 km)

Generator with permanent magnet (alternator) with nominal power of 550 watt.

Engine: principle characteristics

From a technical point of view the engine is very similar to the one already installed to the V11.
A series of optimisations and improvements of single components have been Implemented.

Principal novelties are:
- **alternator** (is explained later in ELETTROMECHANICAL COMPONENTS)
- oil circuit with **pressure valve** and **external oil filter**
- **valve retainer with three grooves** to allow rotation for even wear of the valve
- longer **drive shaft** (4 mm)
- new **1st piston ring** with L-shape to reduce blow-by gas
- **cylinder head and base gasket** metallic
- sintered **valve seats**
- **two spark plugs per cylinder** (is explained later in IGNITION COMPONENTS)
- new **aspect cylinder head covers**
- new **gearbox**

Engine: Lubrication group

The circuit is partially redesigned.
The **pressure valve** is now installed prior to the filter, in case of over pressure (valve opened), circulates the oil to the intake of the oil pump instead of release the oil to the crankcase, avoiding unwanted emulsing.
The **oil filter** is now accessable from the outside (exchange every 10.000 km like V11)
A **strainer** is introduced that improves the intake in any vehicle position and provides particles filtration

The oil level needs to be checked with the dipstick NOT fixed, different from V11, every 1000 km

Every 5000 km the drainage tube from the air filter housing needs to be emptied

Engine: Lubrication group

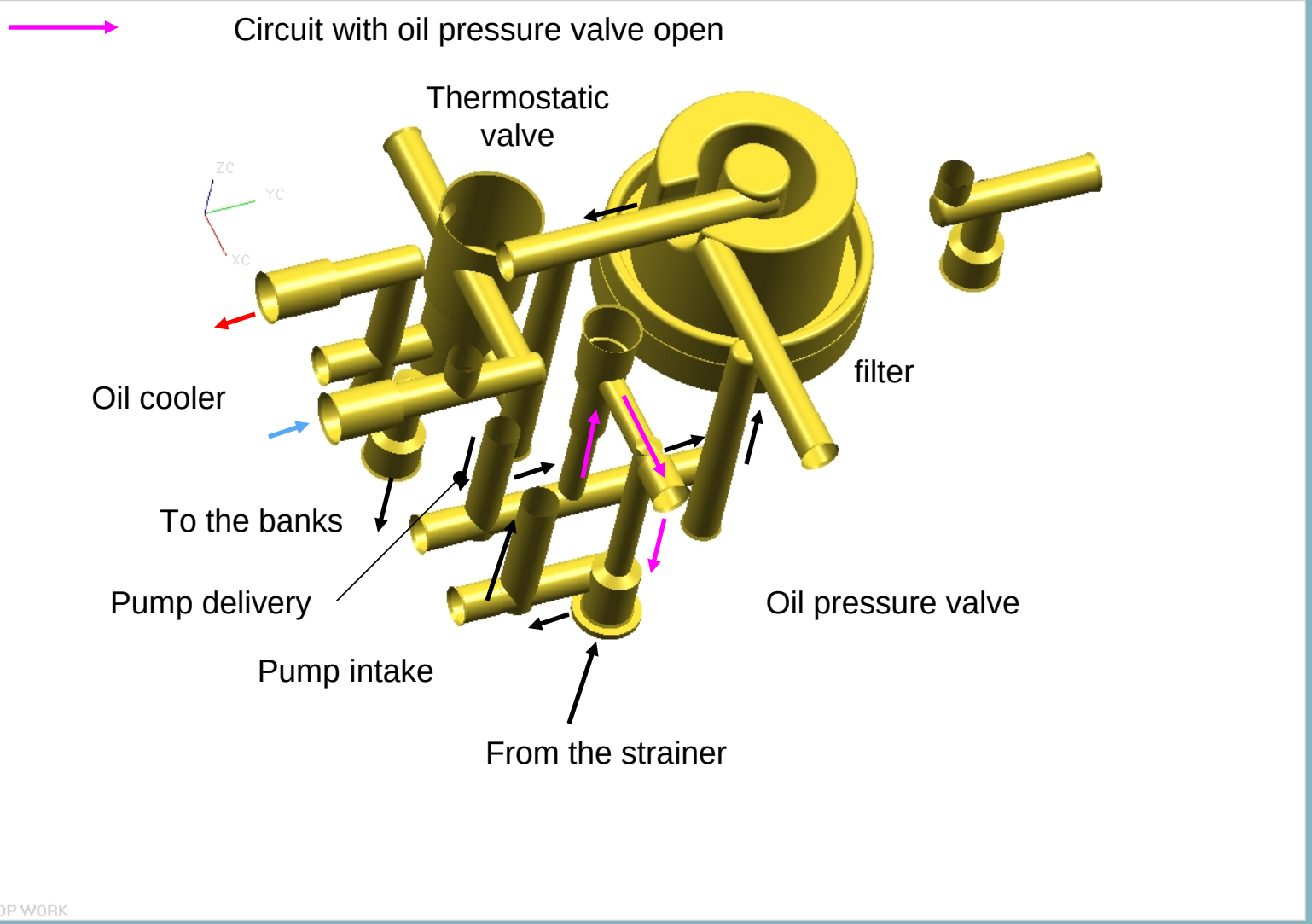
Recommended Engine Oil: Agip RACING 4T 5W-40

Recommended Gear box Oil : Agip ROTRA MP/S 85 W 140

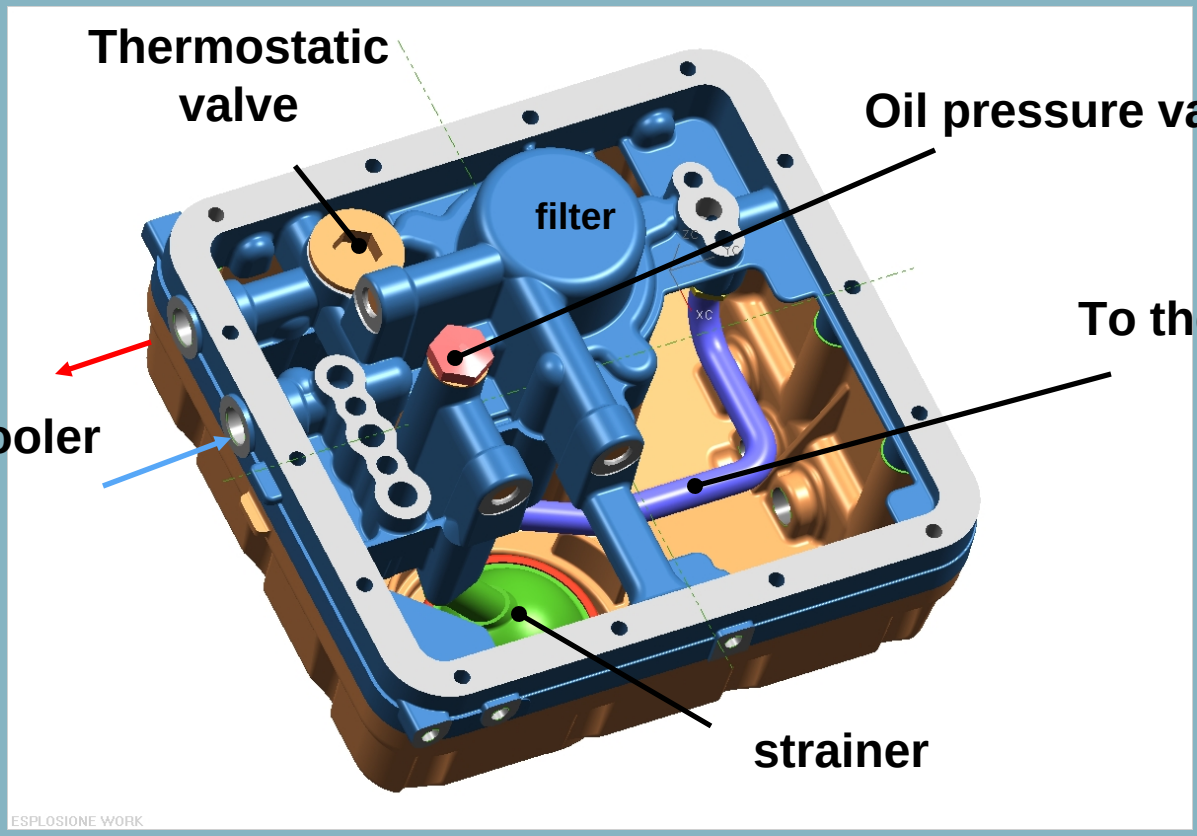
Cardan Oil : TRUCK GEAR 85 W 140

Do not insert
Chemical additives
Nor non recommended
Oils

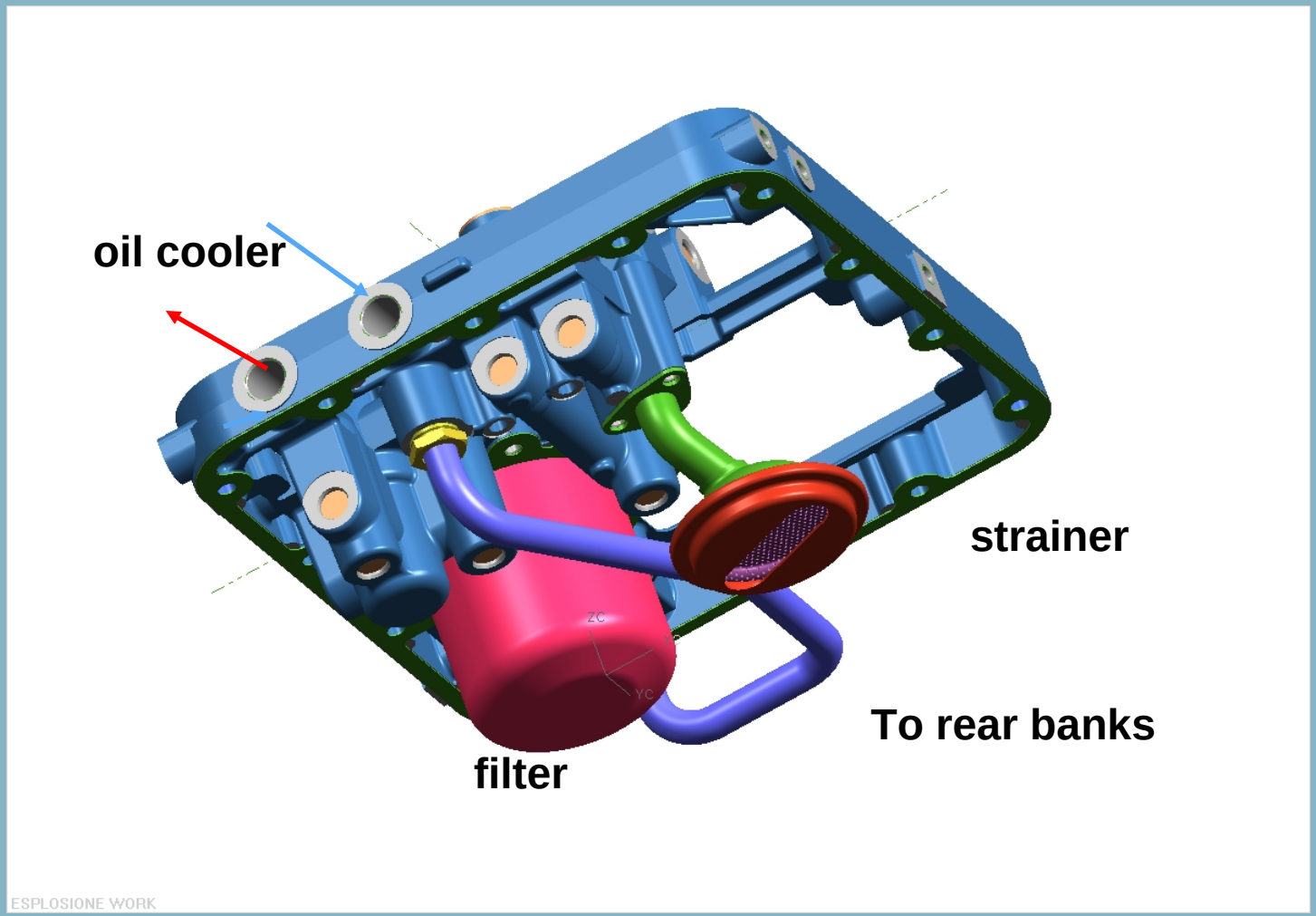
Engine: Lubrication group



Engine: Lubrication group



Engine: Lubrication group



Engine: oil filter

Oil filter

Engine: gearbox

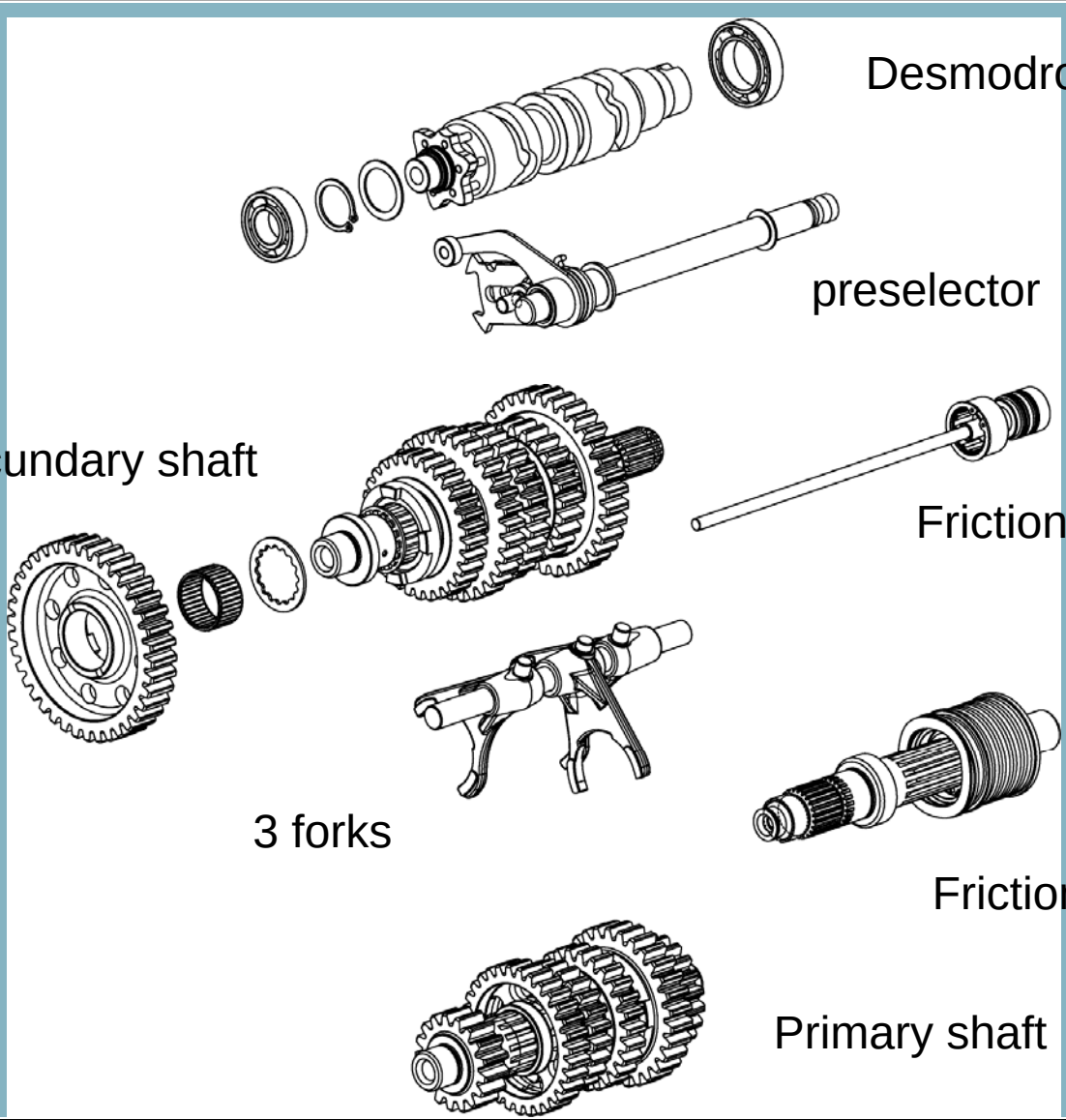
6 speed gearbox with straight sliding gears and flexible coupling

The gears are mounted on roller bearings

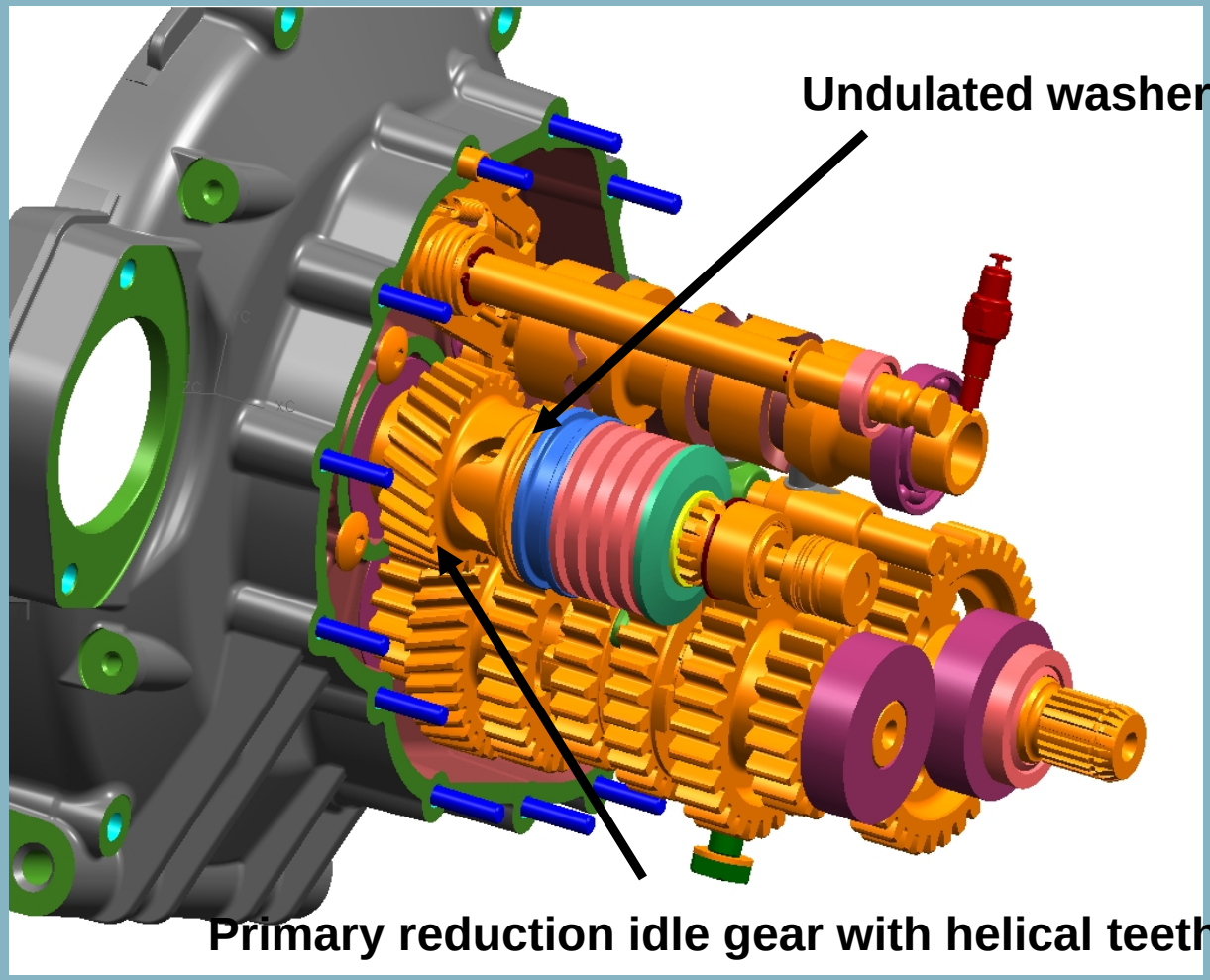
The new pre-selector allows for a softer shift thanks to the desmodromic drum mounted on bearings

The flexible coupling contains an undulated washer that needs to dampen the vibrations at idle (noisy) while the 8 cup springs allow a gradual transmission of the engine torque as well in engagement as disengagement.

Engine: gearbox

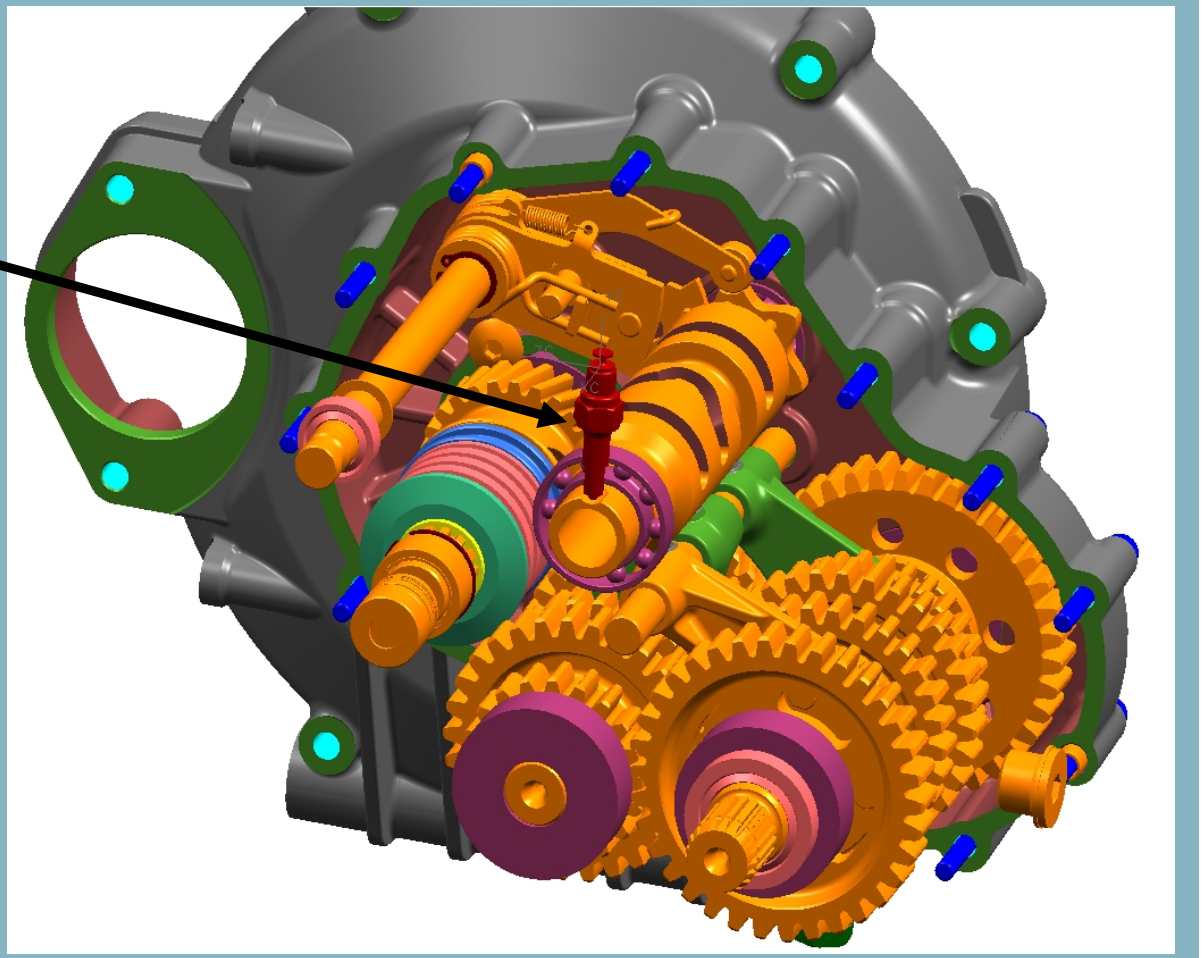


Engine: gearbox



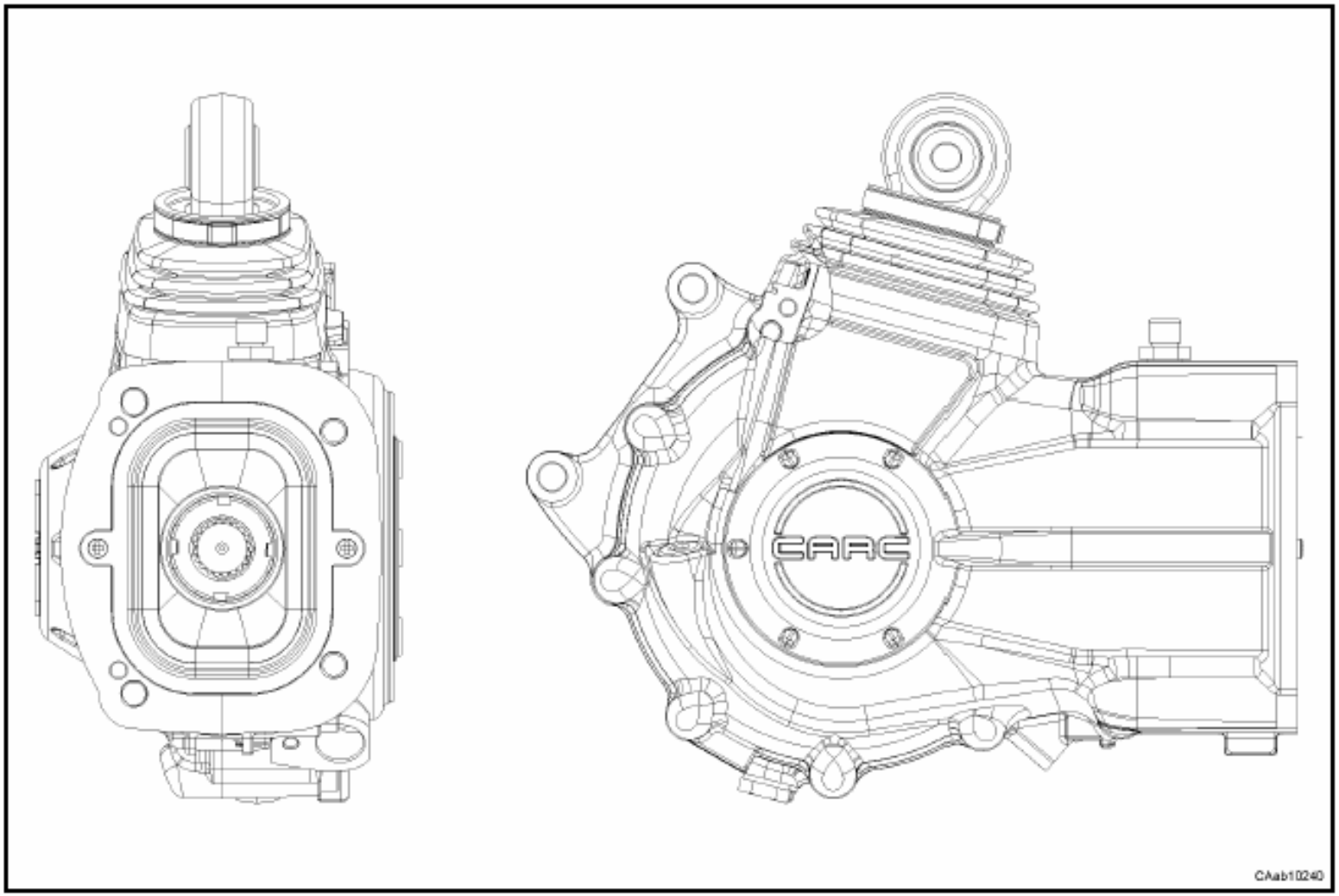
Engine: gearbox

Attention, the neutral switch needs To be removed before extracting The desmodromic drum when Disassembling. In phase of Reassembly it should be installed At the end of the procedure



Oil level is not checked based on a level measurement, but on the correct amount:
500 cc

Transmission gear



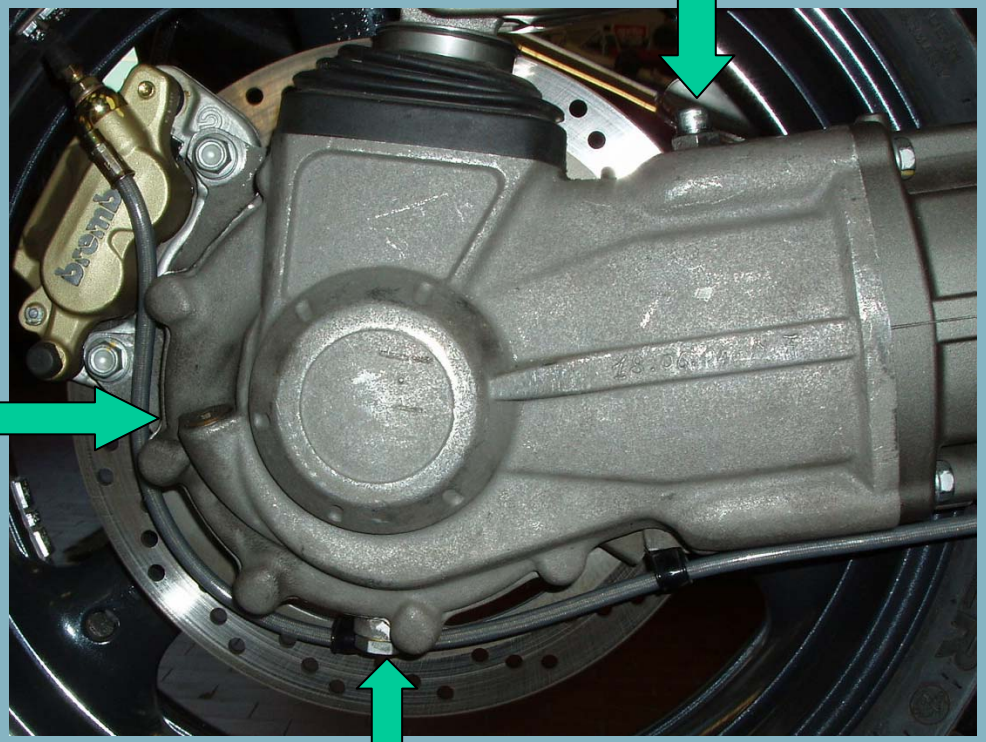
Transmission gear: principle characteristics

DESCRIZIONE	VALORI VALUES	DESCRIPTION
Riduzione coppia conica	3.667 / 1	*Bevel gear ratio*
Coppia continua alla ruota	530 Nm	*Continous couple to the wheel*
Velocità max in entrata pignone	5650 rpm	*Input pinion max speed*
Peso a secco	10.37 Kg	*Dry weight*
Rotazione in entrata SENSO ORARIO SENSO ANTIORARIO	 ● ○	*Input rotation* *CLOCK WISE (C.W.)* *COUNTER CLOCK WISE (C.C.W.)*
Gioco di accoppiamento coppia conica	0.09÷0.14 mm	*Bevel gear set backlash*
Precarico cuscinetti pignone conico (misurato sul D=44 mm senza anelli di tenuta)	25.9÷28.6 daN	*Pinion bearings preloading (measured on D=44 mm without seals)*
Precarico totale cuscinetti corona-pignone (misurato sul D=44 mm senza anelli di tenuta)	32.7÷36.3 daN	*Total pinion-ring gear bearing preloading (measured on D=44 mm without seals)*
Quantità olio richiesta	0.38 litri/*litres*	*Required oil capacity*
Specifica olio	AGIP ROTRA MP 80W 90	*Oil specification*

Pinion housing

Characteristics:

Check and change oil

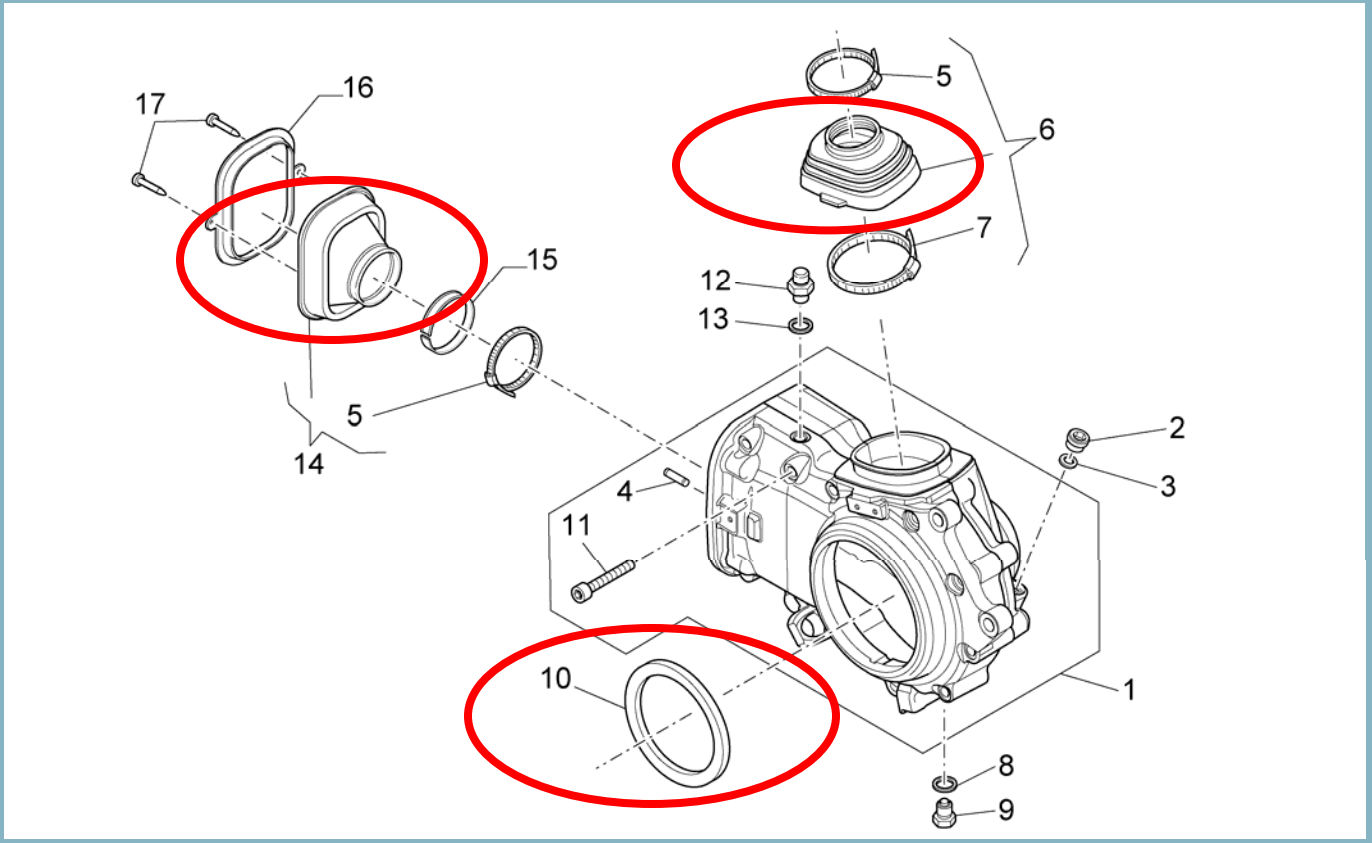


Pinion housing : oil

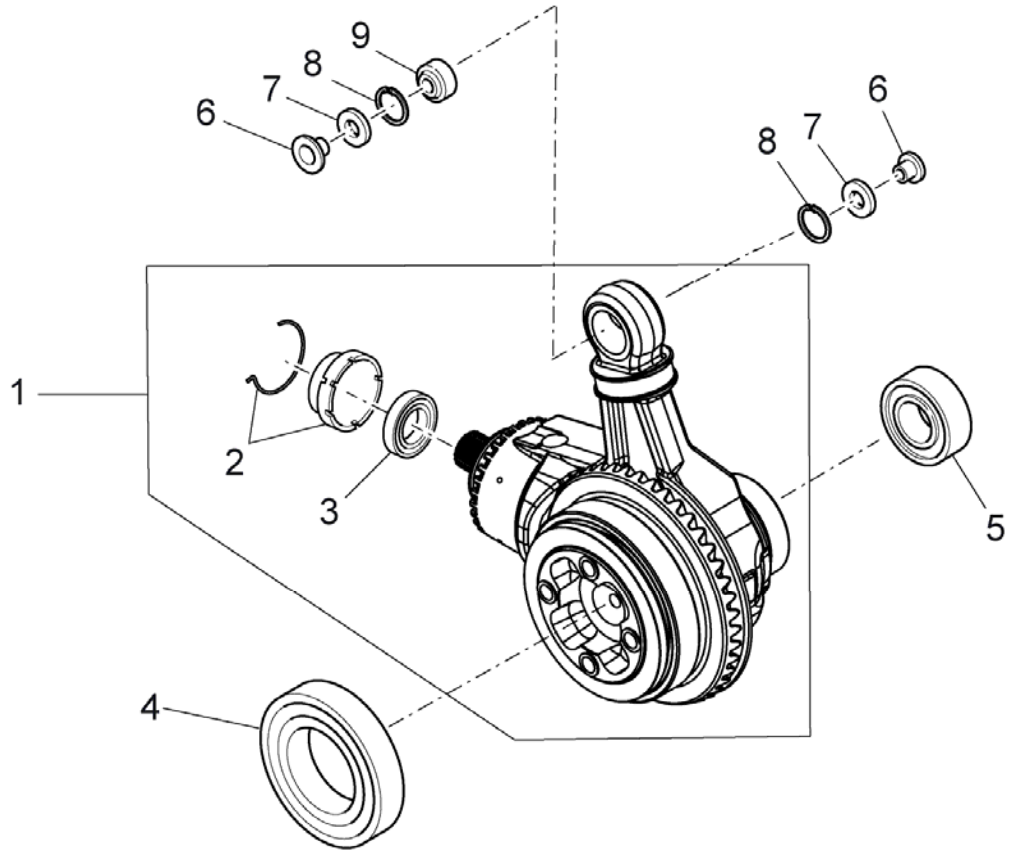
Operazione *Operation*	Primo Intervento *First time*	Manutenzione ordinaria *Ordinary maintenance*
Cambio olio *Oil change*	1000 Km *1000 Km*	stagionale od ogni 20000 Km *seasonally or every 20000 Km*
Pulizia tappo magnetico olio *Clean magnetic oil plug*	primo cambio d'olio *first oil change*	ogni cambio d'olio *every oil change*
Controllo e rabbocco olio *Check and adjust oil level*	1000 Km *1000 Km*	mensile od ogni 5000 Km *mensile or every 5000 Km*

Transmission gear: disassembly and assembly

The assembly/disassembly operations are related to the replacement of the rubber covers 6 and 14 and the washer 10.

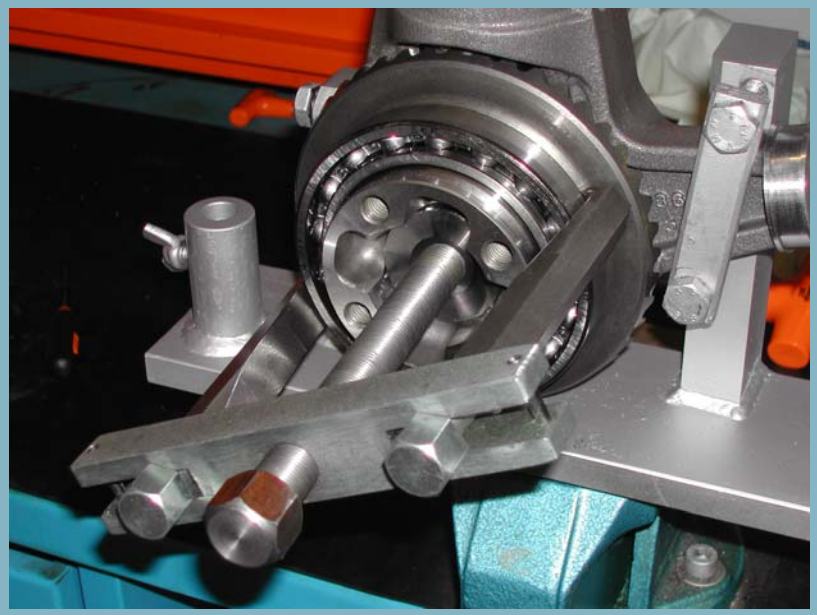


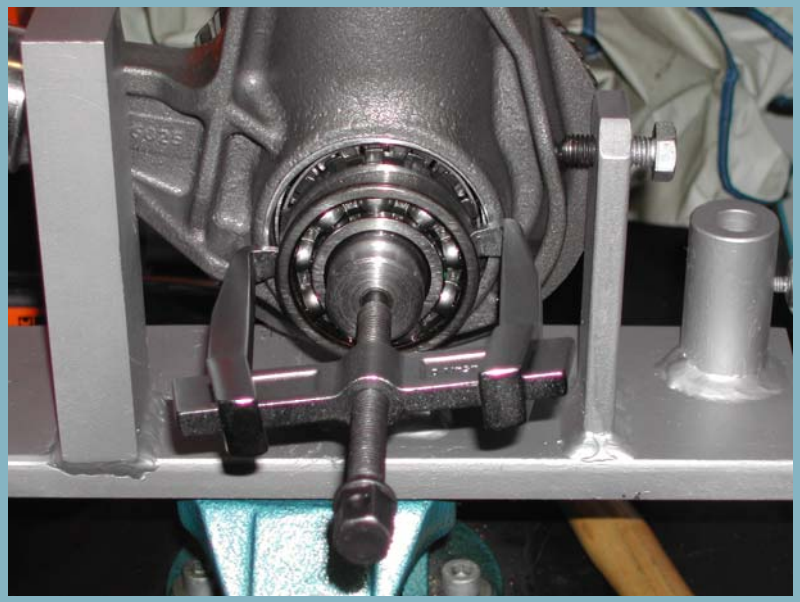
Transmission gear: disassembly and assembly



Transmission gear: disassembly and assembly

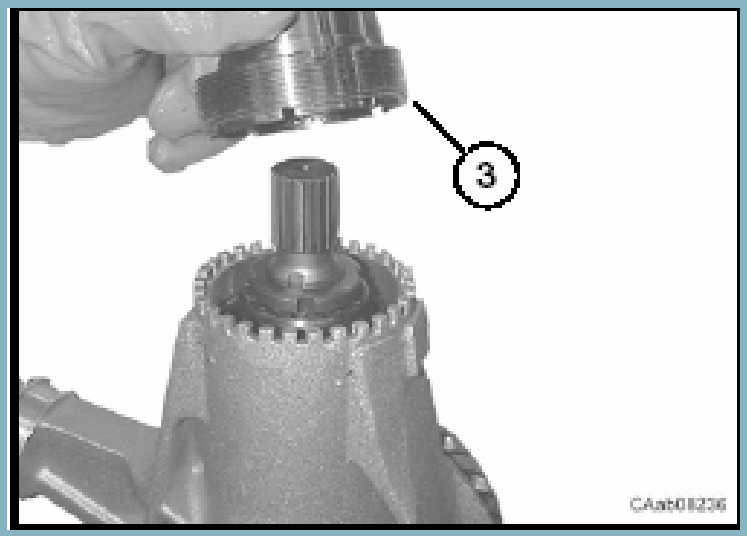
Relative to the rotating axle are replaceable only the 2 bearings with universal pullers.
Reassembly is effected heating both bearings to 100° C





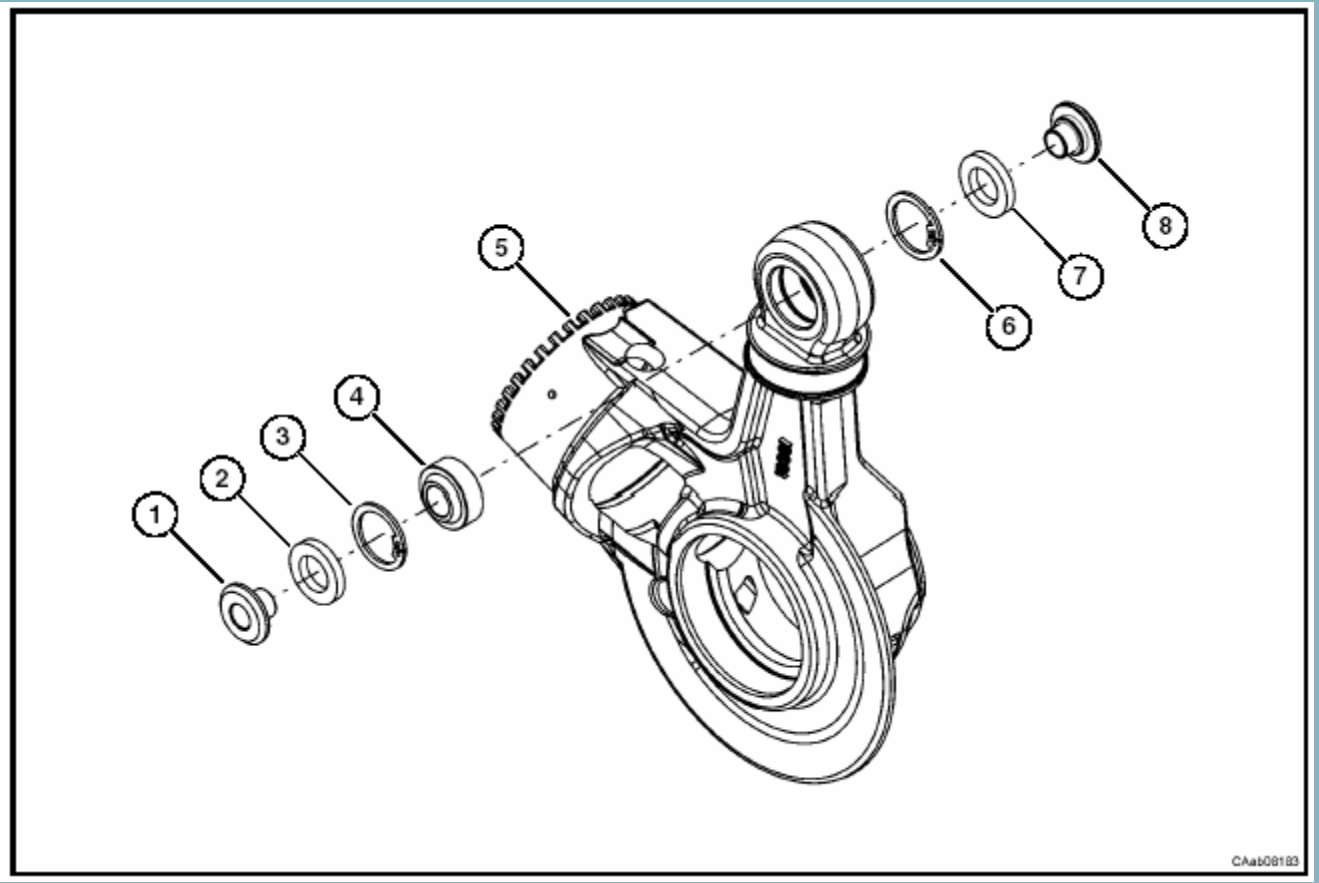
Transmission gear: disassembly and assembly

For the pignon group we can only replace the sealer with its respective holder



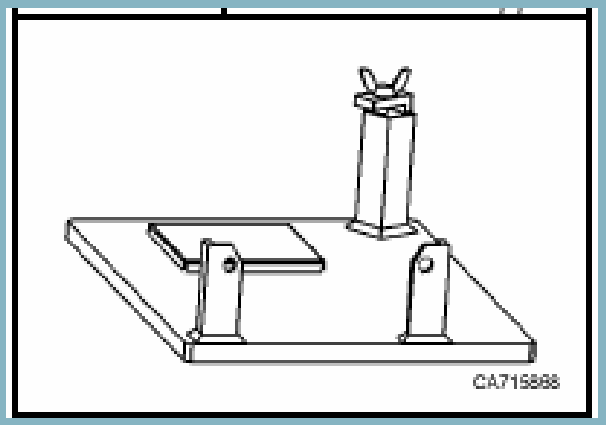
Transmission gear: disassembly and assembly

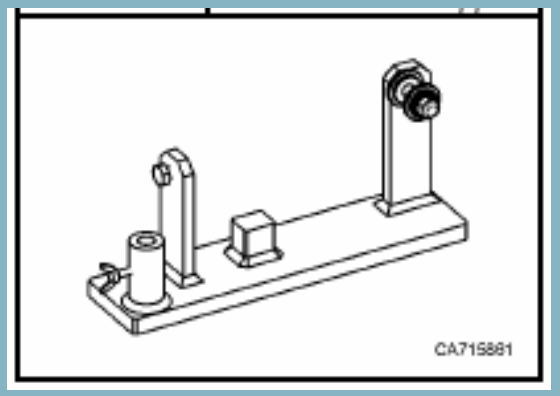
The support group is completely replaceable.



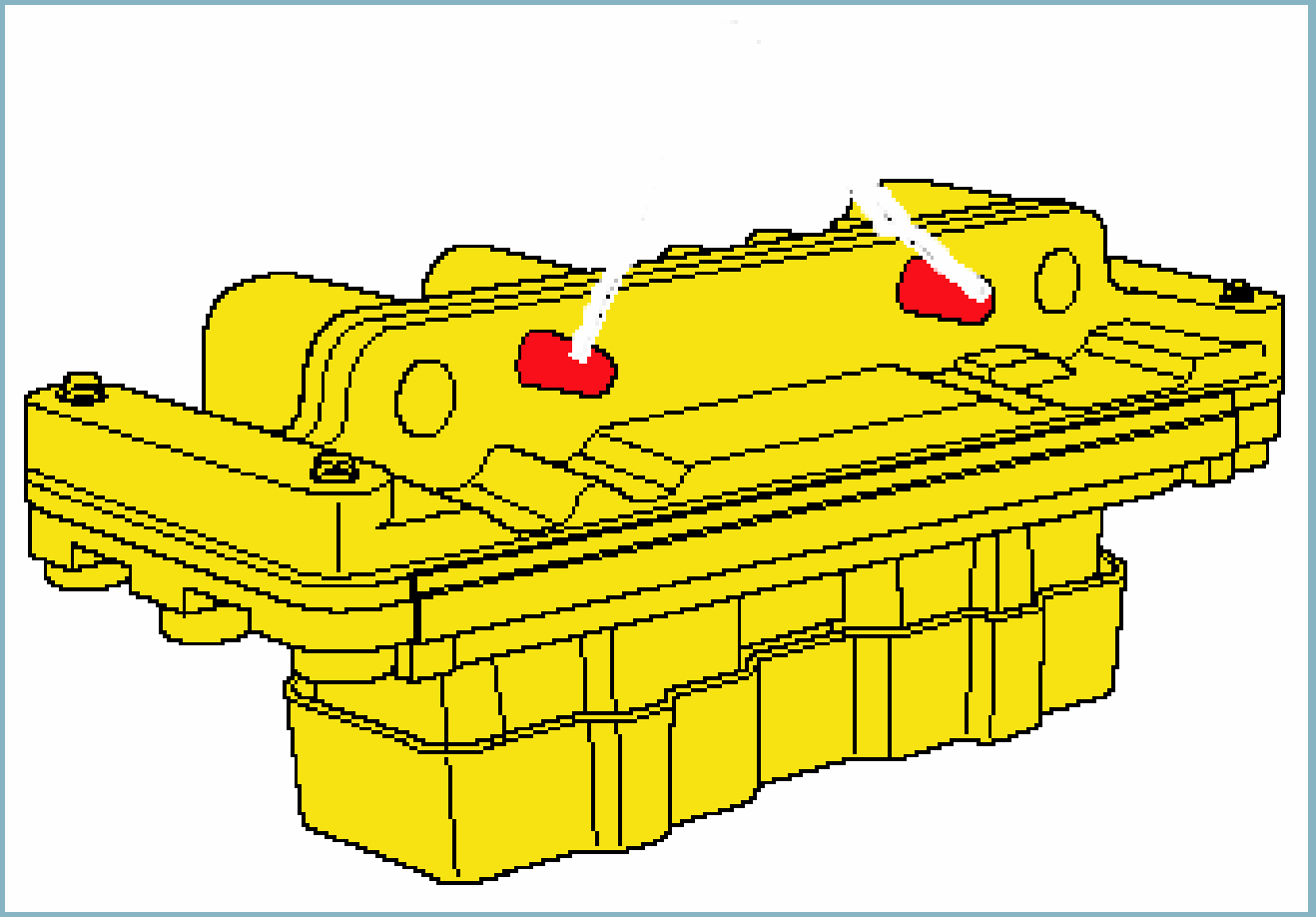
Transmission gear: special tools

Support housing
Tampone tenuta asse ruota
Manico
Tampone snodo sferico
Spanner sealer pignon
Tampone tenuta ghiera pignone
Support transmission gear





Electronic injection



DESCRIPTION INJECTION-IGNITION SYSTEM

General information on injection-ignition system

The injection and ignition system with electronic integrated control allow to optimize performance and operation of the engine, reducing the specific consumption and polluting elements in the exhaust gas.

With these systems, as a matter of fact, is guaranteed an optimal report between air and fuel and ignition timing advance management

Electronic injection

Effect of the relation air to fuel and ignition timing advance

➔ **The correct management of the relation between air and fuel and the ignition timing advance is the basis of the optimal functioning of the engine.**
The ideal relation between air and fuel is the stechiometric relation in weight, which determines the complete combustion

insufficient air or air in access will create a rich or lean mixture, which will influence output and consumption as well as emissions in the exhaust. The electronic ignition advanced control allows to optimize the performance of the engine, create maximum output, reduce fuel consumption and polluting elements in the exhaust gas.

The electronic ignition advanced control integrated with the injection control, allows to realize the best functioning of the engine in all conditions of its use (starting at low-temperature, phase of warming up, transitional phase of acceleration and deceleration, engine in conditions of partial load, full load and idle speed)

Electronic injection

The computer is an electronic unit of the digital type with microprocessor .To realize optimal functioning of the engine, via a series of sensors, functioning and condition of the engine are continuously monitored.

The principal sensors are:

- Engine RPM sensor	**measures the number of revolutions of the engine and the phase of each cylinder with respect to TDC**
-Throttle position sensor:	**measures the opening angle of the throttle valve**

Secondary or correction sensors are:

- Pressure sensor (in dashboard):	**measures barometric pressure**
- Air temperature sensor:	**measures intake are temperature**
- Engine temperature sensor:	**measures engine temperature**

Electronic injection 5AM 2

Actuator control is determined by the information received from the sensors:
- amount of fuel injected to each cylinder in sequential mode and not parallel, by controlling the opening time of the injectors and thus also injection timing is referred to the intake stroke of each cylinder
- ignition timing advance (ignition coil)

Principal novelty on the system of injection with computer Marelli 5AM 2l lies in the control of idle speed that is affected by a stepper motor that allows air to enter in the combustion chamber by-passing the throttle valve.

Its position is modified by the computer to maintain idle speed stabilized, in function of environmental conditions (engine temperature, air temperature,…)

Electronic injection : fuel circuit

Fuel tank: capacity l 23 ± 0,5 l

The fuel pump group that is positioned in the fuel tank contains:

- **fuel level indicator sensor**
- **fuel filter**
- **fuel pressure regulator**
  nominal pressure value 3bar

- **power supply 12V**

Electronic injection : fuel circuit

Injectors

The command sent by the computer is of the pulsating type. This will determine the movement of the center part of the solenoid, revealing the opening of the injector

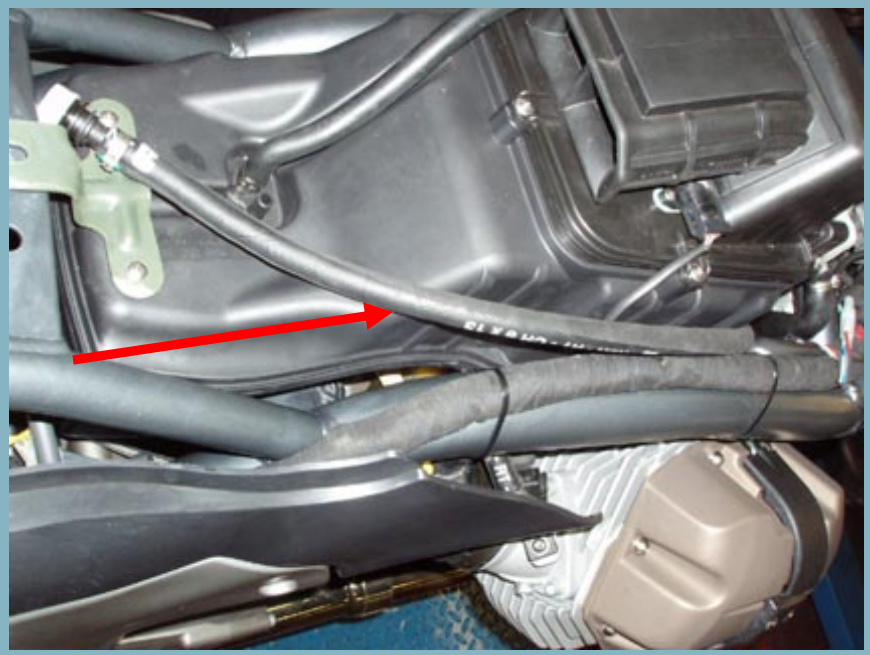
With a constant fuel pressure determined by the regulator, present on the pump, of 3±0,2 bar, the quantity injected depends exclusively of the opening time of the injector

Power supply 12V

Resistance 14 Ω ± 2 at 20°C

Electronic injection : fuel circuit

Pay attention to the position of the fuel tube from fuel tank to injectors that needs to run aside the air filter not underneath



Electronic injection : intake air

- **Air temperature sensor** NTC installed in air filter housing

°c	kohm
-40	100.950
-0	9.750
+10	5.970
+20	3.750
+30	2.420
+40	1.600
+90	0.280

Electronic injection : intake air

Potentiometer throttle valve

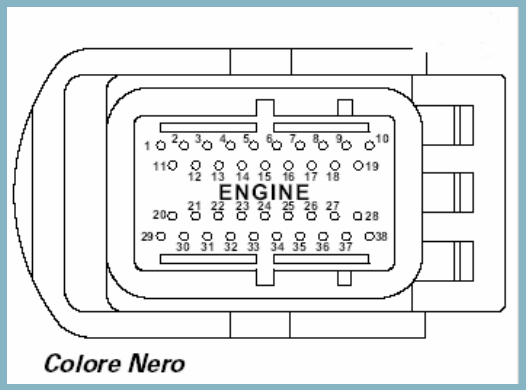
This sensor informs the computer about the position of the throttle valve. The mechanical degrees are transferred into an electrical signal under the form of voltage. In function of this signal the computer foresees to adjust the time of injection to optimize the stechiometric report.

Connector with three wires:
Power supply 5V
Ground provided by computer
Valve position signal, scale:
Appr. from 0,55 (at stopper) to
4,4 V(max. opening)

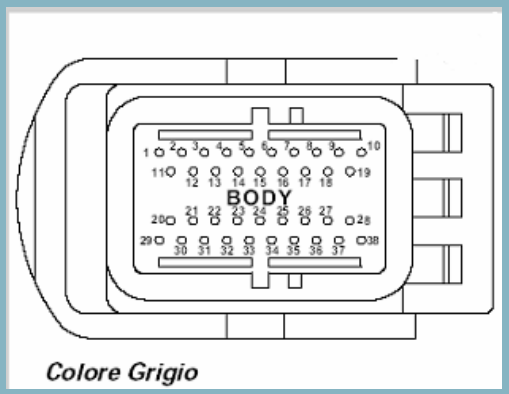
Electronic injection :computer 5AM 2

Located in front underneath the fuel tank has to connectors

Connector A - from 1 to 38 pin



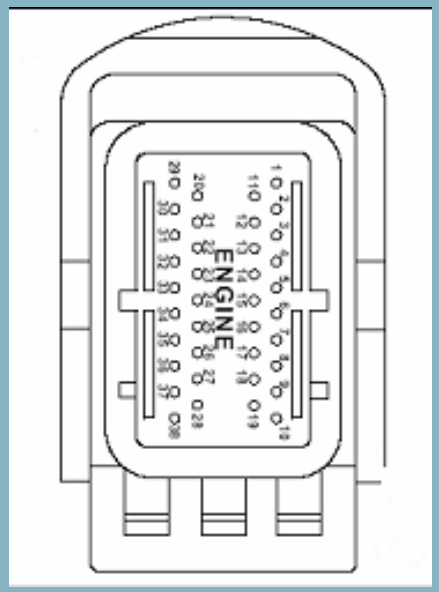
Connector B - from 1 to 38 pin



Electronic injection :computer 5AM 2

Connections Engine Computer

Connector A



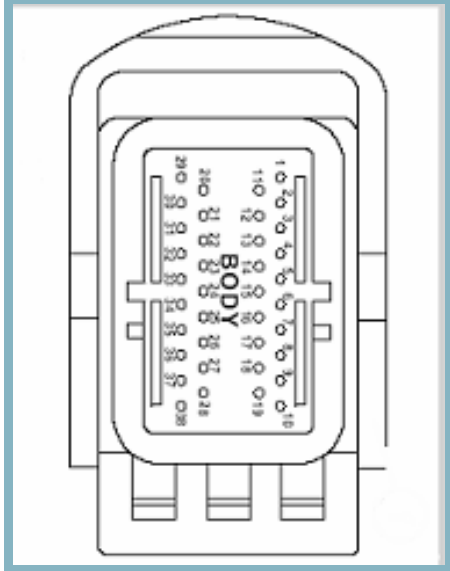
* Not connected

1*
2*
3 TPS signal
4*
5 Engine temperature sensor
6*
7*
8*
9 stepper motor +
10 command ignition coil rh.
11*
12*
13*
14 air temperature signal
15*
16*
17 stepper motor +
18 stepper motor –
19 stepper motor –
20 power supply 5V (sensors NTC)
21*
22*
23 neutral signal
24*
25 RPM sensor signal
26*
27*
28 Injector cylinder lh.
29 Power-supply TPS sensor.
30*
31*
32 ground TPS sensor.
33*
34 shield wire RPM sensor
35 RPM sensor signal
36*
37 injector cylinder rh
38 ignition coil lh.

Electronic injection :computer 5AM 2

Connections Engine Computer

Connector B



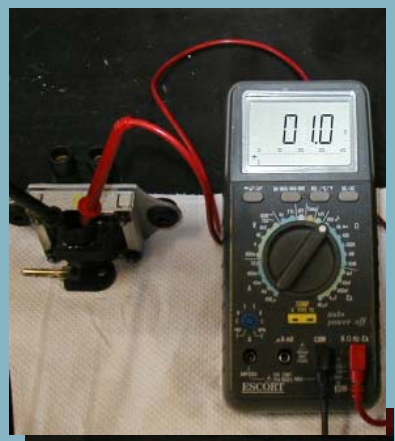
1 start relay command pin 85
2*
3*
4 protected power-supply from dash board
5*
6 secondary relay command pin 86
7 k-line (reprogramming dashboard)
8*
9*
10*
11 negative command oxygen sensor
12*
13*
14*
15*
16 K- line (diagnosis)
17 power-supply main relay
18*
19*
20 CAN – H (ccm/dashboard)
21*
22 oxygen sensor signal
23*
24 speed sensor signal in
25*
26*
27 “engine kill” in
28 start signal in
29 CAN – L (ccm/dashboard)
30*
31*
32 power supply oxygen sensor
33 clutch sensor signal
34*
35 fall down sensor signal
36*
37*
38 lateral stand sensor signal.

* Not connected

COMPONENTS –IGNITION

The system used is of the inductive type.
The computer works with following parameters:
- Engine load,
- Engine temperature,
- Injection time: determines the command of ignition advance

Primary: to measure between pin 1and 15.
value:
0,9 a 1,1 Ω



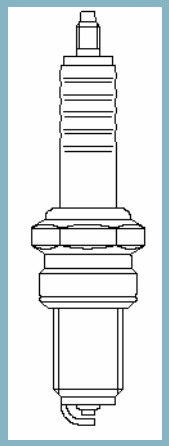
Secondary: to measure at the high tension exits.
value:
6,5 a 7,2 KΩ

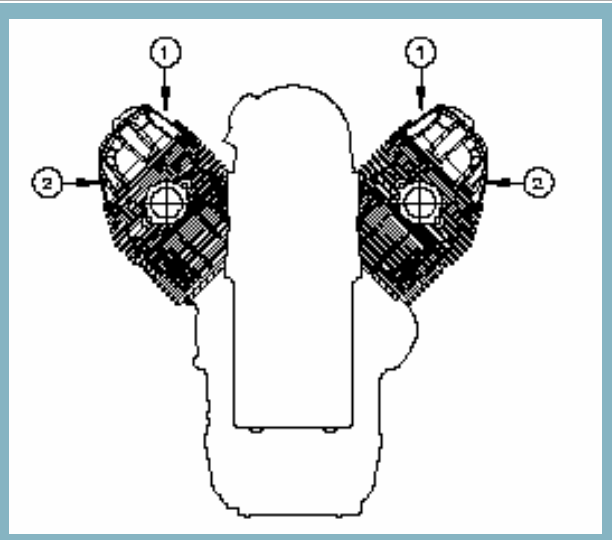
COMPONENTS –IGNITION

Spark plug cap and spark plug

Engine equipped with double ignition

Production make
NGK
position 1 PMR8B
position 2 BPR6ES
Cap resistances 5 k Ω





To avoid fast wear of the platinum electrodes of the internal plug, it is important not to switch The high tension cables on the bobine

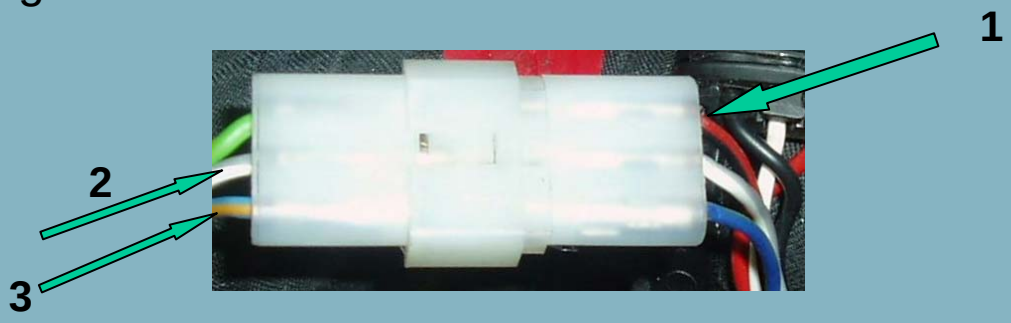
(cable with red marking – external plug)

COMPONENTS – ELECTRICS

Speed sensor

Located at front fork:
inductive active type

Connector with 3 pin:
➔Power-supply 12V
➔Outgoing signal from pin 24 connector B
➔ground



Resistance:
With connector disconnected
between pin 2 e 3
from 500 to 600 Ω circa

COMPONENTS – ELECTRICS

Engine temperature sensor

This sensor is supplied with 5V has NTC characteristic, sends to the computer a variable signal in function of the temperature, to manage stochiometric report during engine warm-up

°C	KΩ	°C	KΩ
- 40	100.950	+40	1.600
- 30	53.100	+50	1.080
- 20	29.120	+60	0.750
- 10	16.600	+70	0.530
0	9.700	+80	0.380
+10	5.970	+90	0.280
+20	3.750	+100	0.204
+30	2.420	+110	0.153
		+125	0.102

COMPONENTS – ELECTRICS

Crankshaft position sensor

RPM and alignment sensor, measures engine RPM and position of each cylinder with respect to TDC. A sensor with connector with tree wires.:

pin positive tension
pin negative tension
pin shield wire
Resistance value **650 to 720 Ω circa**

Air Gap:
Measures sensor length with Calliper:
From 0,6 mm to 0,7mm

COMPONENTS – ELECTRICS

Idle speed control

The computer in order to increase the amount of by-pass air, with in consequence the increase of engine rpm at idle, uses a stepper motor.

Its function consists of a displacement of the central axis which by its rotational movement opens and closes the bypass, thus allowing air to by-pass the throttle valve.

The parameters used to vary the passage, coming from various sensors are:

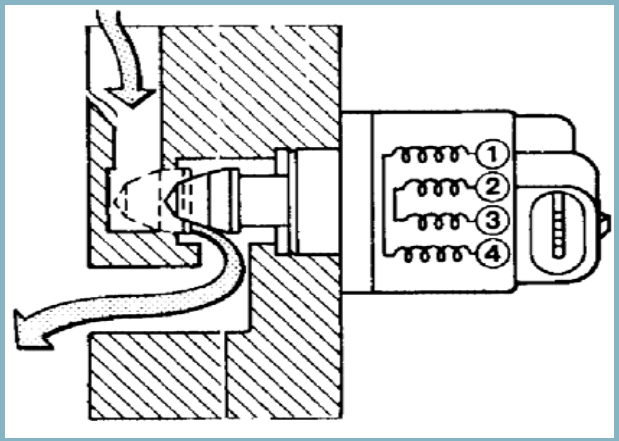
- Engine RPM

-Coolant temperature

If the engine is warmed-up, the stepper motor operates in CLOSED LOOP to obtain target speed set by the computer

Impulse Commands

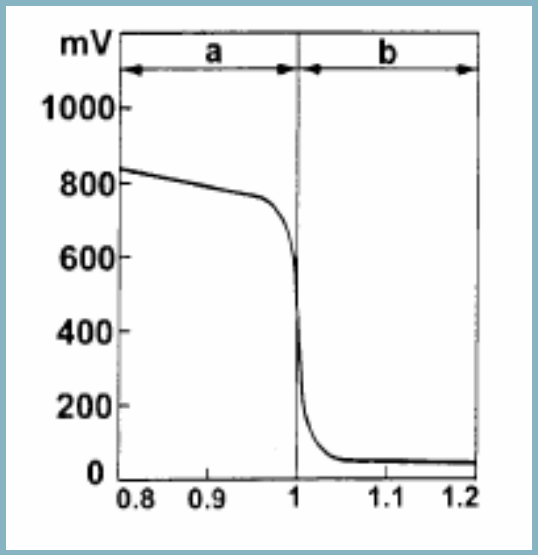
Resistance value:
between 1 and 4 = 50 Ω
between 2 and 3 = 50 Ω



Emission control

To obtain an ideal mixture it is necessary that the amount of intake air for the combustion is in equal measure to the theoretical amount needed for a complete combustion of the fuel injected in the intake manifold

- λ > lean mixture
- λ < rich mixture
- λ = optimal



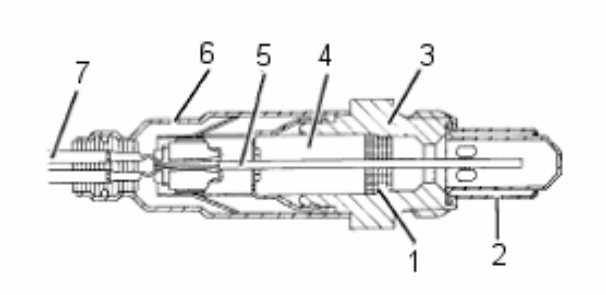
a. Rich mixture (lack of air)
b. Lean mixture (too much air)

COMPONENTS – ELECTRICS

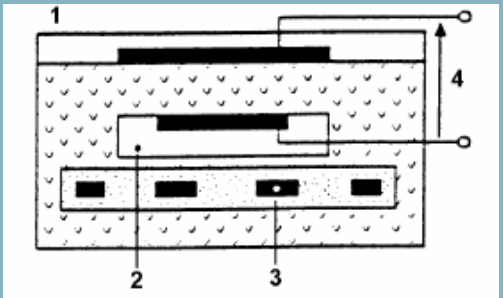
Lambda Sensor

In contact with exhaust gas, the oxygen sensor generates an electrical signal of which the value represents the amount of oxygen present in the exhaust gas itself.
Because the censor and needs to reach a temperature of about 350°C to function correctly, in order to avoid thermal shock at cold engine condition, the computer foresees in sensor heating. Sensor and heater are integrated in a ceramic element thus obtaining fast heating. In this way in very short period of time is obtained the control in so-called closed loop (lambda control) which stochiometric report

- 1 ceramic coating
- 2 protection element
- 3 sensor body
- 4 ceramic support
- 5 plane sensor
- 6 protection
- 7 electric wire



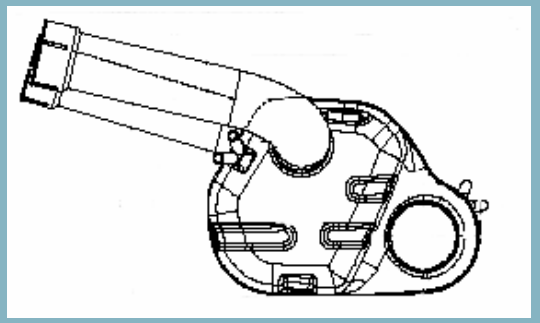
Schematic of sensor



1- exhaust gas
2 – reference air
3 - heater
4 –reference tension

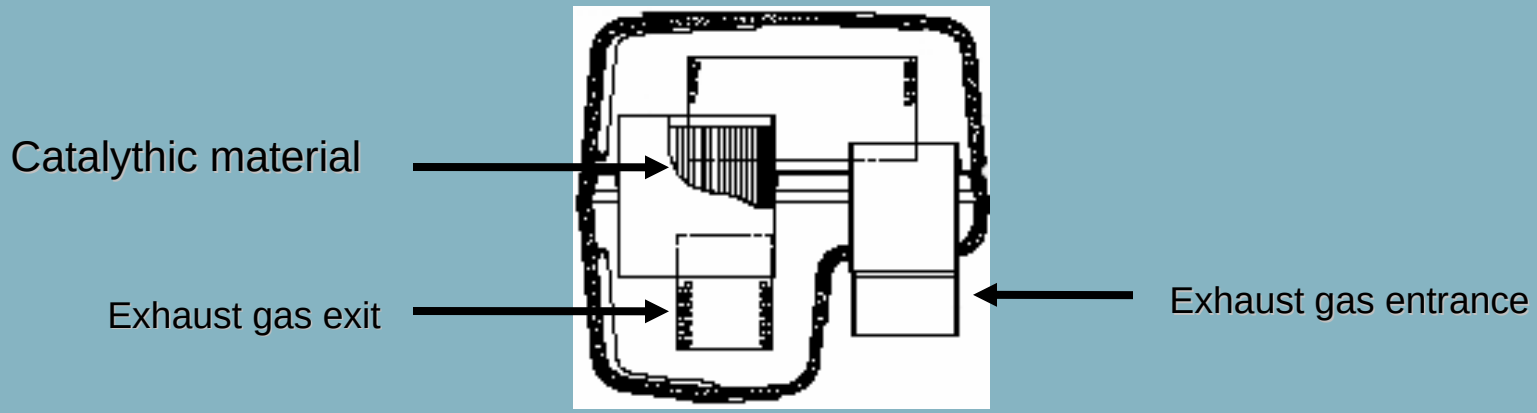
COMPONENTS – ELECTRICS

Three-way catalytic converter



This component is used to reduce three principal polluting elements:
- Carbon Monoxide = CO
- Raw hydrocarbons = HC
- Nitrogen oxides = NO_x

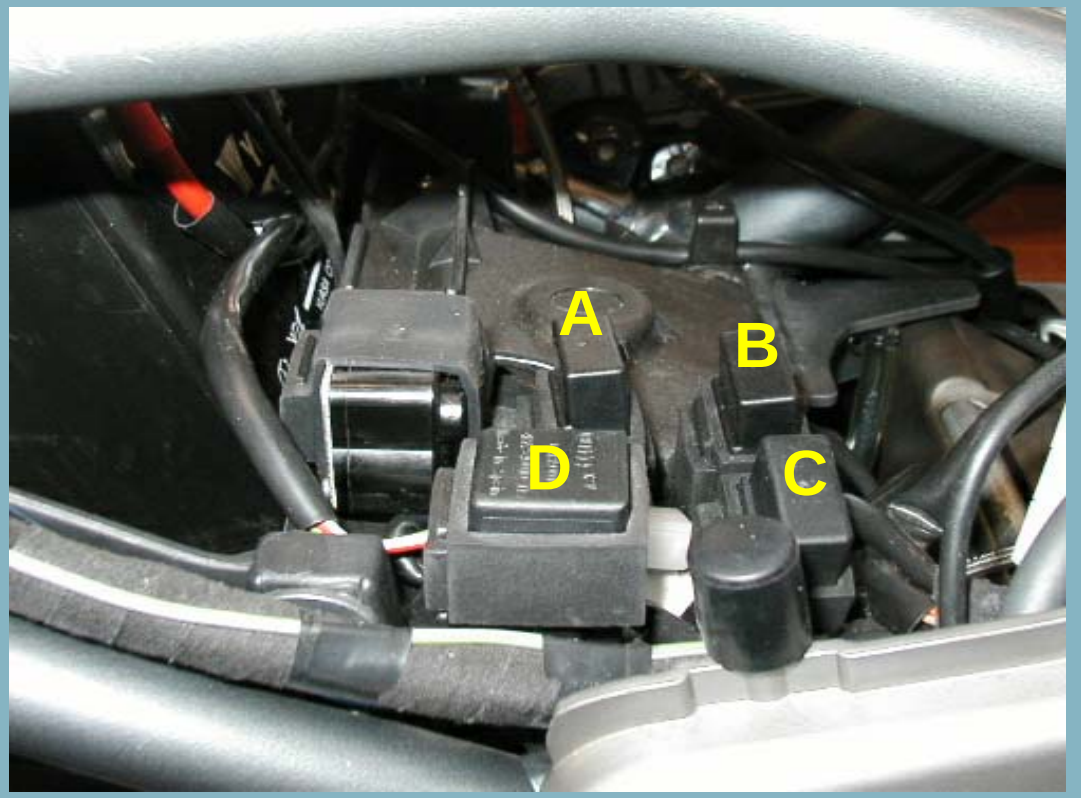
the internal construction consists of a metallics support in which is deposited a substrate of a chemical material that under operating temperature initialise a catalytic process, transforming CO in CO2, HC and NOx in water vapour and N2.



COMPONENTS – ELECTROMECHANICS

Relays (under the seat)

A = Secondary injection relay
B = Lights relay
C = Start relay
D = Main injection relay



Battery (under the seat)

YTX 20 CH-BS 18A/h
Maintenance Free

COMPONENTS – ELECTROMECHANICS

Engine oil pressure sensor

This sensor per default is shorted to ground. With the engine running the pressure existing in the lubrication system will interrupt the contact, signaled by pin 3 of the gray connector in the dashboard

Neutral sensor

Also this sensor per default is shorted to ground. Every time the vehicle is shifted into gear the contact remains open signaling to the computer via pin 23 of black connector (A)

COMPONENTS – ELECTROMECHANICS

Starter motor

The activation of this actuator is realized by a solenoid commanded by the computer:
- Key ON
- Security switches line in continuity
- Start switch on

This command remains present in the computer for 10 seconds; only when 400 engine rpm are achieved the signal is automatically deactivated.

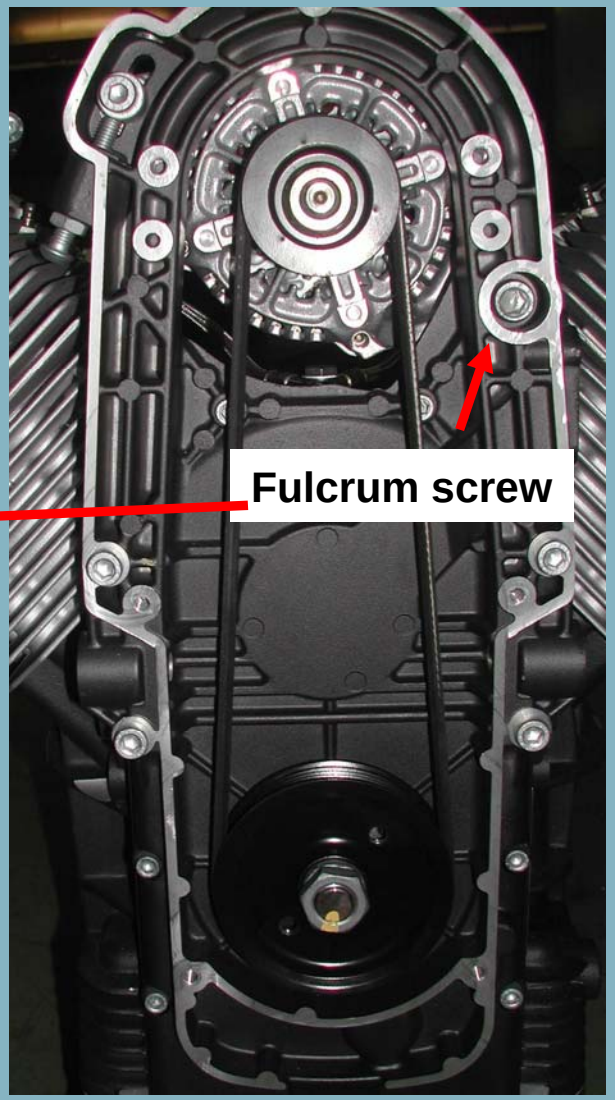
characteristics:
12V

COMPONENTS – ELECTROMECHANICS

Alternator

characteristics:
12V nominal
Max load 40A (550W)
Initial load > 1110 rpm
Regulator 14,2 to14,8V
5000 rpm 10A- 25°C
Range Temp. – 30 a 90°

Belt replacement every 50.000 km



Belt tensioner

COMPONENTS – ELECTROMECHANICS

Procedure for the alternator belt tensioning

To set the correct tensioning of the belt it is necessary to use the specific tool: "**belt tensioner tool**". and torque wrench

- Fix the fulcrum screws of the alternator (M10) at approximately 10 Nm
- Put tension to the belt according to the value described in the workshop manual (different between belt installed for first-time or already installed at least one time) and lock the alternator with the locking screws
- Fix the securities bolts and the relative nut
- Fix with the correct torque the fulcrum screws and the locking screws

Security systems

The security system exists of the following components:
- Fall sensor
- Clutch sensor
- Neutral sensor
- Stand sensor

All of these sensors are directly connected to the computer which in function of the signals received from these components allow the functioning of the engine and its start-up

Fall sensor

This sensor correctly positioned and with the engine running is in open contact. In case the vehicle falls over, the sensor closes its contact to ground via pin 35 of connector B.

The computer sensing this dangerous situation stalls the engine

If the vehicle is turned upright again, one needs to wait 10 seconds after turning key to off before turning back to on to allow starting, (activating the power latch)

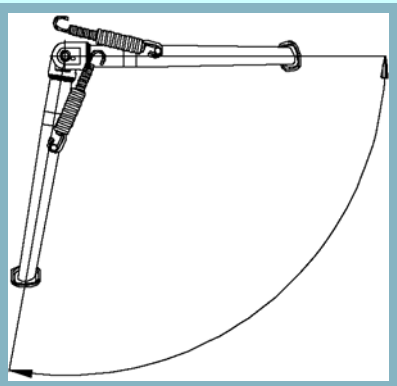
Security systems

LOGIC LATERAL STAND/CLUTCH FOR BREVA 1100 01.03.04					
GEAR	**STAND**	**CLUTCH**	**ENGINE**	**STARTING**	**STAND WARN. LIGHT**
NEUTRAL	UP	ENGAGED	FUNCTIONS	POSSIBLE	OFF
		DISENGAGED			
	DOWN	ENGAGED			ON
		DISENGAGED			
GEAR	UP	ENGAGED			OFF
		DISENGAGED			
	DOWN	ENGAGED	DOES NOT FUNCTION	NOT POSSIBLE	ON
		DISENGAGED			

GEAR: Neutral position means contact closed. In gear means contact opened

STAND: Raised means contact closed, lowered means contact open

CLUTCH : Engaged means contact closed, disengaged contact open



ENGINE DIAGNOSIS

Diagnostic connector

Besides the possibility to effectuate the diagnosis of the engine ECU via the dashboard in position "diagnostics" faults ACT, the diagnostic connector is available under the seat next to the fuse box. This connection allows to control with Axone in section parameters eventual reprogramming of the computer (currently not foreseen) and activate some components of the injection system, visualise faults both ACT and MEM

AXONE

AXONE

Software Axone:

The new software 5.0.4 for Axone will permit the connection to the ECU

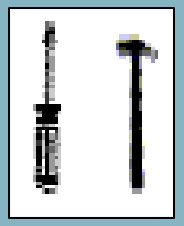
Select AUTODIAGNOSI, BREVA, 1100, and confirm following the Axone instruction showed on the screen.

Throttle valve zero position learning procedure

Is performed in following circumstances:

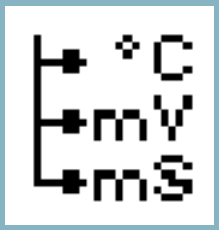
- **Throttle valve body and or sensor replacement,**
- **Computer replacement or cylinder balancing**

Select in the screen ADJUSTING PARAMETERS



The parameter LEARNING THROTTLE POSITION SENSOR

- **How do we verify correct implementation? In the screen parameters engine**



I should see : throttle position 4,7±0,2 °

AXONE

Recovery function

In case any of the following sensor signals is disturbed the computer continues operation with replacement values.

Dashboard and Axone in any case are showing the malfunction.

Air temperature:	**25 °C**
Engine temperature:	**30 °C , with linear increase parallel to air temp.**
Barometric pressure:	**1010 hPa**
Throttle position sensor:	**2,9 ° at minimum, otherwise variable**
Stepper motor:	**Fixed value**

Sonda Lambda:

To verify if the computer uses the lambda sensor feedback signal can be seen in Screen Components status

The parameter STATUS LAMBDA: should indicate CLOSED.

This condition can be verified at idle, only when all following conditions are met :

Air temperature above 18 °C

Engine temperature above 18 °C

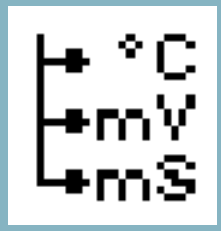
Engine has operated for approximately 2-3 minutes

AXONE: active screens

ISO screen:

- **MAP** **Visualise actual mapping present in computer**

Engine parameter screen:



Visualise the usual engine parameters. New are the parameters for the stepper motor

- **STEPPER C.L.** **indicates the step number set by the computer**
- **EQUIVALENCE OF STEPPER** **if not at idle, indicates air contribution by the stepper motor in degrees of throttle opening**

AXONE: active screens

Component status screen:

It is possible to visualise the component status for the security components and other systems, like the lambda sensor and rpm sensor

- **FALL SENSOR: If vehicle is fallen over it shows TIP OVER**
- **SWITCH RUN/STOP: I can see in which status the switch is**

- **IGNITION: indicates if the computer based on the status of the security components and immobiliser will allow for engine starting**

AXONE: active screens

Screen component activation:

- **From this screen I can activate a series of components**
- **The CANCEL ERRORS will only delete errors from the engine computer memory**

Screen error visualisation:

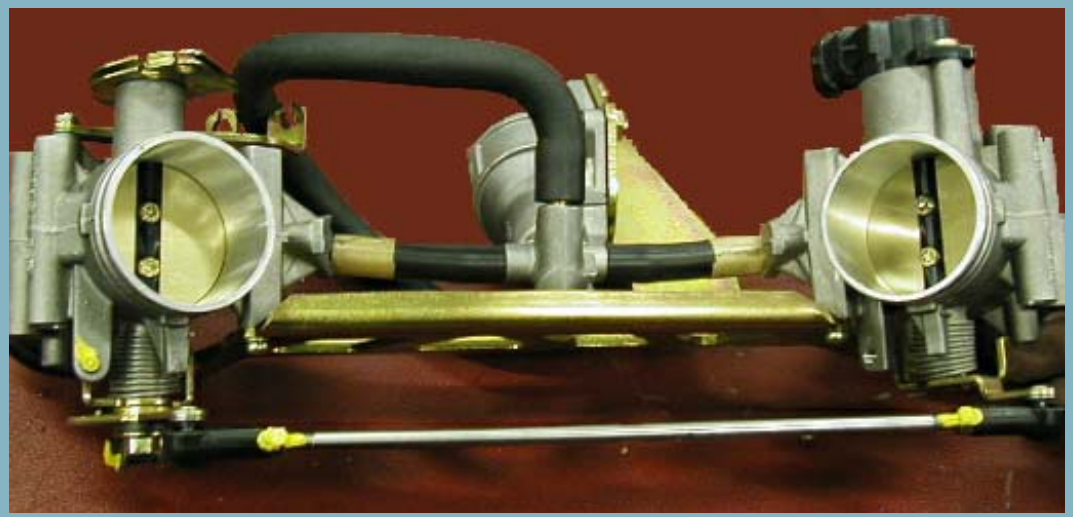
For the majority of detected errors, once selected the error and pressing the enter button on Axone, one will see a detailed description of the error.

THROTTLE BALANCING

Procedure of adjustment and controlling throttle bodies

Connect Axone to the diagnostic connector of the vehicle and to its battery and follow the indications given by Axone

- ➔**Connect the vacuum meter to the two intake collectors**
- ➔**Connect Axone and follow indications**
- ➔**Put the key to ON**
- ➔**Make sure there are no faults present in the computer. In case there are, resolve them and restart the procedure**

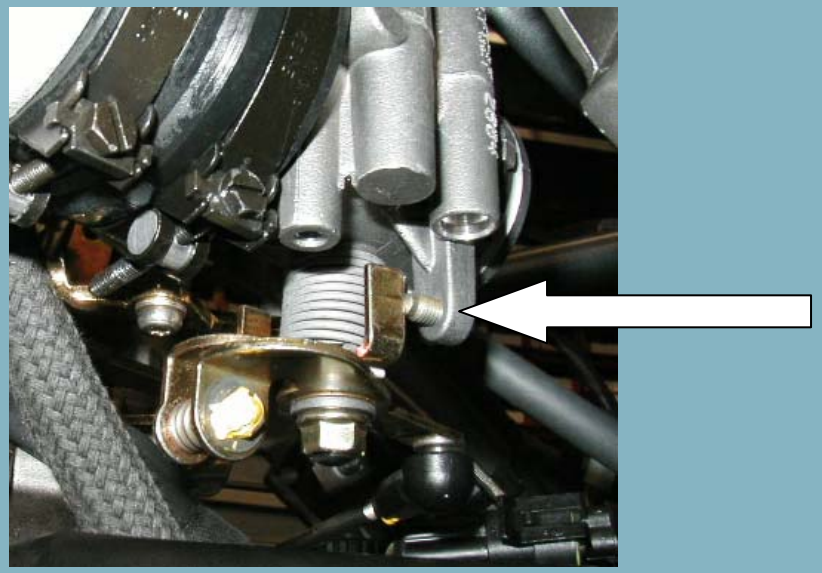


THROTTLE ALIGNMENT

➔ **Assure that the LH throttle is resting at the stopper**

Note:

Don’t move absolutely the throttle stopper, to avoid the need of throttle body replacement.



Throttle stopper

➔ **Select the parameter “Self learning of the throttle” in the screen Regulating Parameters**

➔ **Turn the key to OFF for 30s**

➔ **Turn the key to ON to reestablish the connection with Axone**

➔ **Check that the value indicated “Throttle” is 4,5 – 4,9 °. In case the value is not correct replace the engine computer and repeat the procedure from the beginning.**

THROTTLE ALIGNMENT

- ➔ **Completely close the by-pass screws**
- ➔ **Start the engine and warm up to 60°**

Run the engine at 2000/3000 rpm and with the vacuum meter, check if there is a correct difference of vacuum between the two cylinders of maximum 1 cm Hg (1,33 kPa).

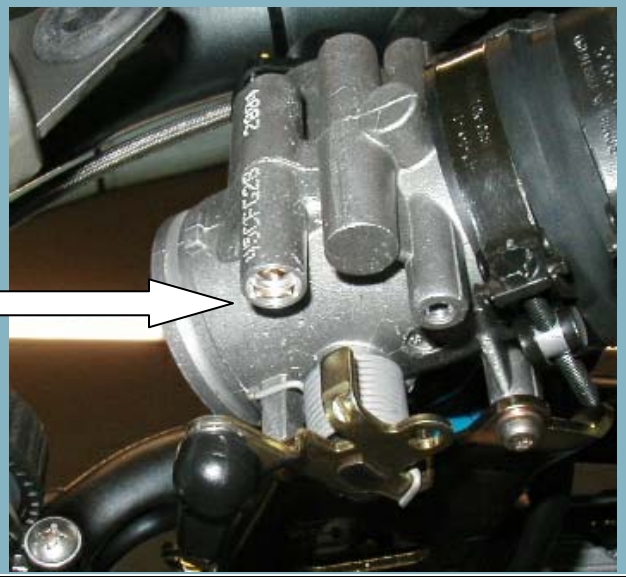
If this is the case continue at point 1

If difference is higher proceed at point 2

1. **Run the engine at idle and check that the vacuum between the two cylinders is balanced. If this is not the case open ONLY the bypass screw of the cylinder with the highest underpressure to obtain equal values between left and right**

Bypass LH

Bypass RH



ALLINEAMENTO FARFALLE

2. **Adjust the adjuster on the throttle bodies connecting rod to reduce the vacuum difference between left and right**.

➔ Apply again the procedure for **“Autolearning throttle position”** as explained before

➔ Run the engine at idle and check the vacuum difference between left and right. If difference exists open ONLY the by-pass screw on the side with the higher underpressure to obtain correct balance.

SPECIAL TOOLS: new

preliminary list

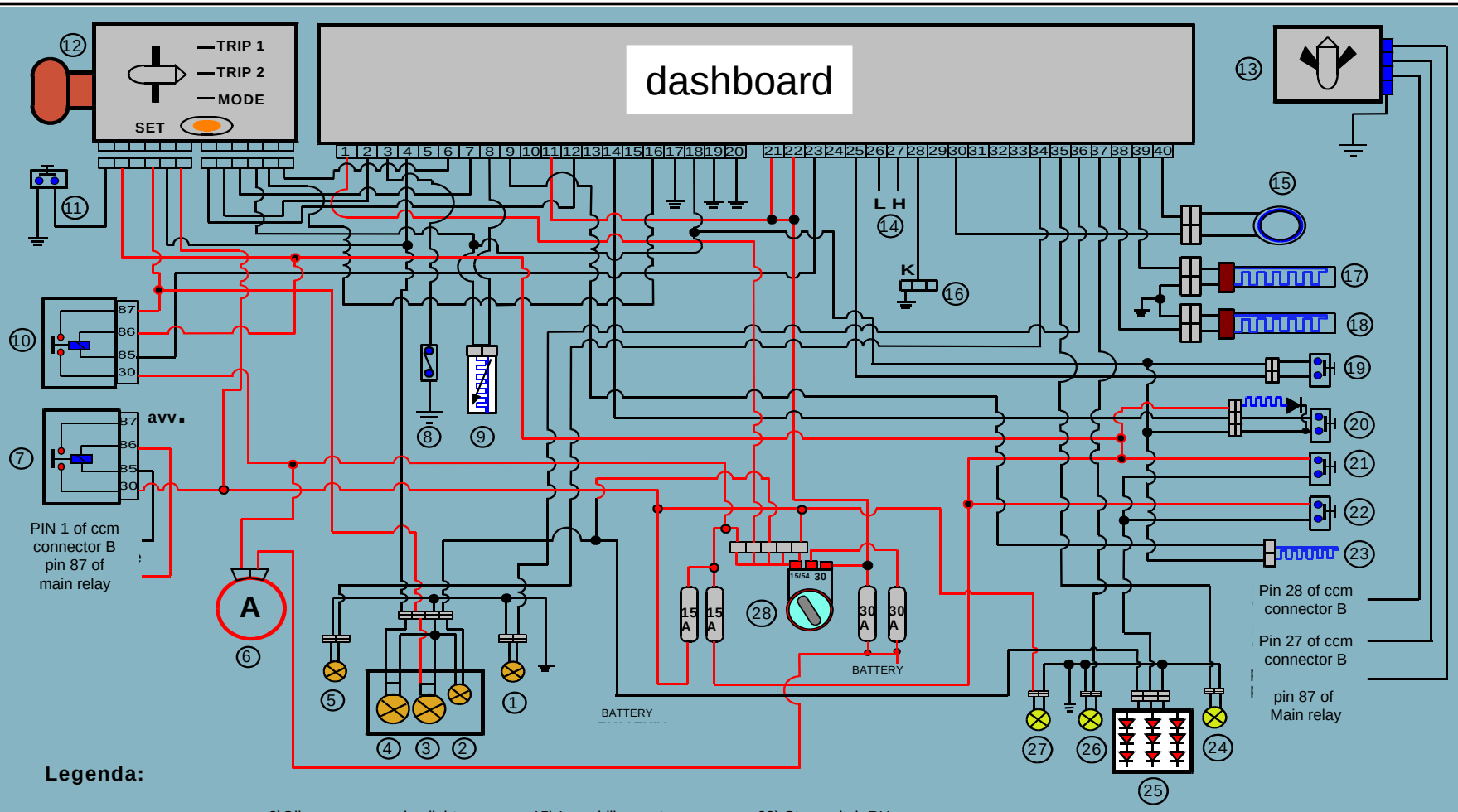
	codice	nome attrezzo	note
1	05,94,86,30	belt tensioner tool	
2	05,91,17,30	front cover insertion cone	oil return ring protection cone on cover
3	05,91,26,30	dismantling clutch tool	4 teeth, d.38 mm. Also usable for damper adjustment: equal to RSV 1000 code 8140191
4	05,91,25,30	gearbox opener	
5	05,90,19,30	internal sparkplug spanner	allows removal with filter installed
6	05,92,80,30	piston ring compressor	d.interno cilidnro=92 mm
7	05,92,72,30	distribution cover washer	punzone

SPECIAL TOOLS: existing

preliminary list

	codice	nome attrezzo	note
8	30949700	Attrezzino rimozione anelli forcella	verificare se va bene questo del V11
9		ghiera sterzo	va bene quello dell'RSV 1000 D.48 mm codice 8140190
10	01 92 91 00	Chiave per smontaggio coperchietto sulla coppa e filtro	attrezzo effettuato per V11
11	14 92 96 00	Supporto per scatola cambio	attrezzo effettuato per V11
12	19 92 96 00	Disco graduato per controllo messa in fase distribuzione e accensione	attrezzo effettuato per V11
13	17 94 75 60	Freccia per controllo messa in fase distribuzione e accensione	attrezzo effettuato per V11
14	12 91 36 00	Attrezzo per smontaggio flangia lato volano	attrezzo effettuato per V11
15	12 91 18 01	Attrezzo per bloccare il volano e la corona avviamento	attrezzo effettuato per V11
16	10 90 72 00	Attrezzo per smontaggio e montaggio valvole	attrezzo effettuato per V11
17	30 91 28 10	Attrezzo per bloccaggio corpo intero frizione	attrezzo effettuato per V11
18	30 90 65 10	Attrezzo per montaggio frizione	attrezzo effettuato per V11
19	14 92 71 00	Attrezzo per montare l'anello di tenuta sulla flangia lato volano	attrezzo effettuato per V11
20	12 91 20 00	Attrezzo per montaggio flangia lato volano completa di anello di tenuta sull'albero motore	attrezzo effettuato per V11
21	19 92 71 00	Attrezzo montaggio anello di tenuta sulla flangia lato volano	attrezzo effettuato per V11
22	14 92 73 00	Attrezzo per tenuta ingranaggio albero a camme	attrezzo effettuato per V11
23	65 92 84 00	Mozzo per disco graduato	attrezzo effettuato per V11

EWD : DASHBOARD

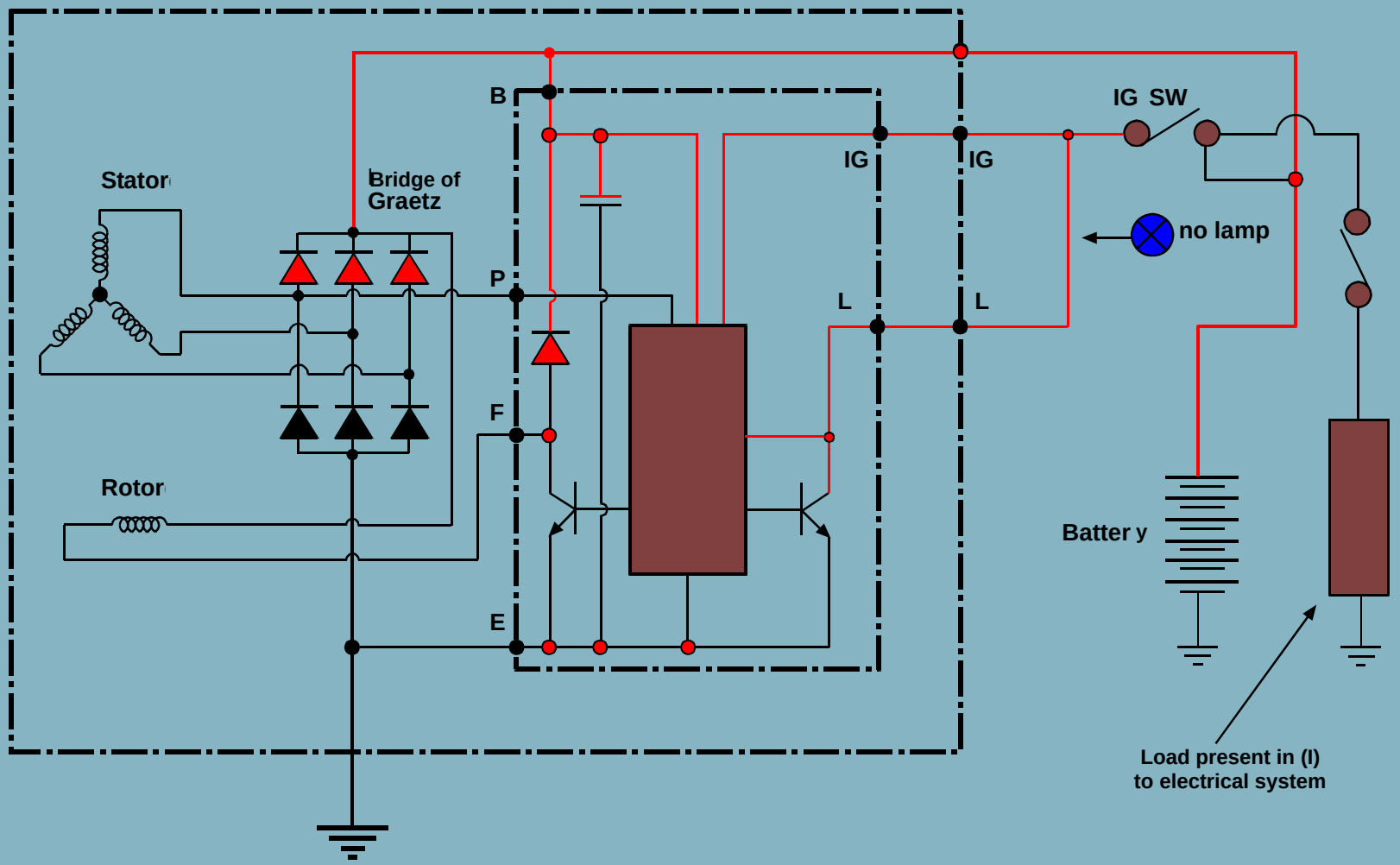


Legenda:

1)Front indicator RH
2)Front position light
3)Beam headlight
4)Headlight
5)Front indicator LH
6)Alternator
7)Starter relay
8)Oil pressure warning light
9)Fuel level sensor
10)Light relay
11)Horn
12)Light switches LH
13)Light switches RH
14)CAN line
15) Immobilizer antenna
16) Diagnostic connector
17) Heated handle RH
18) Heated handle LH
19) Handle heater switch
20) Hazard switch
21) Stop switch LH
22) Stop switch RH
23) Ambient air temperature
24) Rear indicator RH
25) Stop light
26) Rear indicator LH
27) License plate illumination
28) Ignition switch

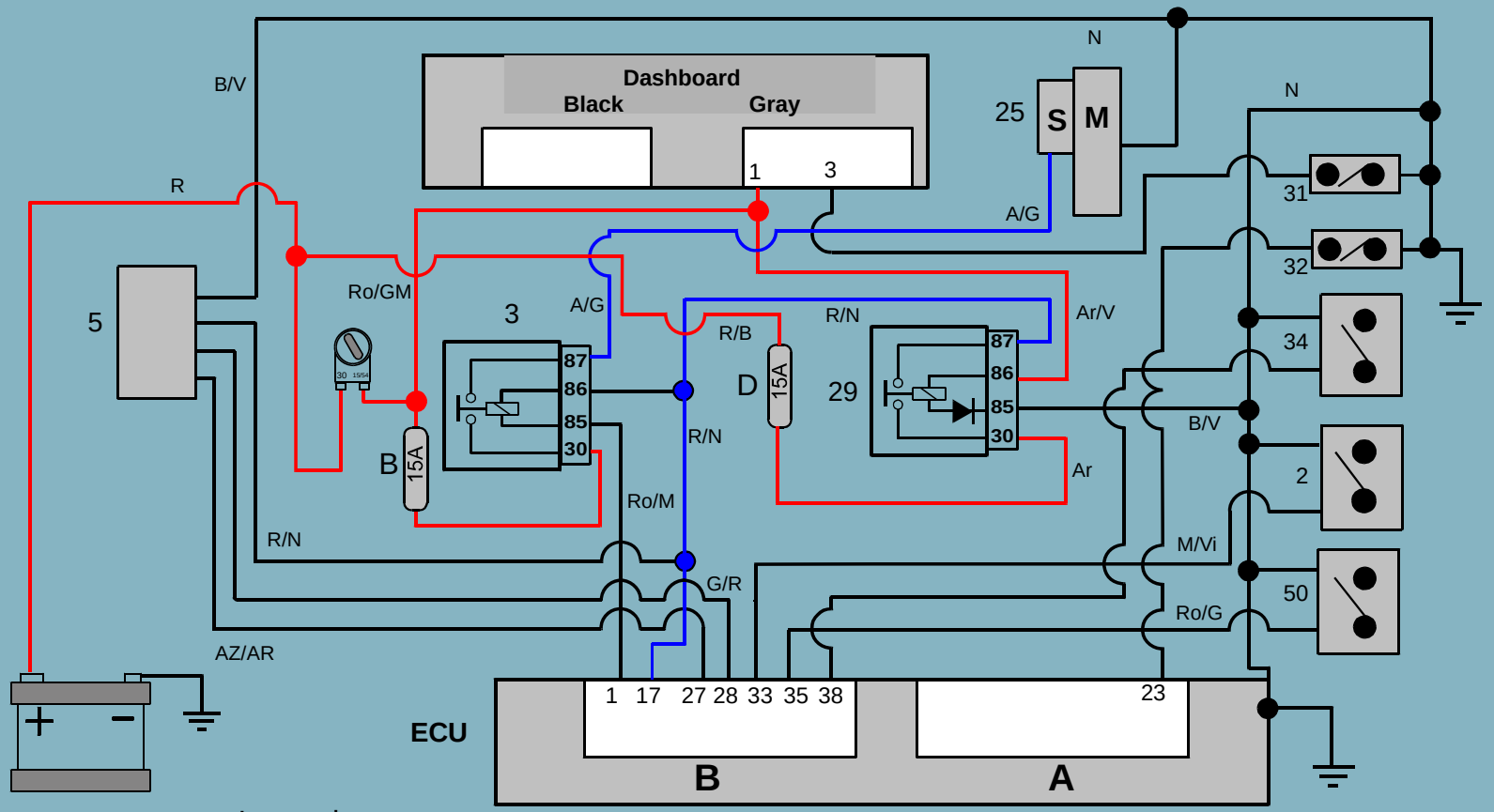
EWD : ALTERNATOR

Wiring diagram alternator



EWD: SECURITY SYSTEM

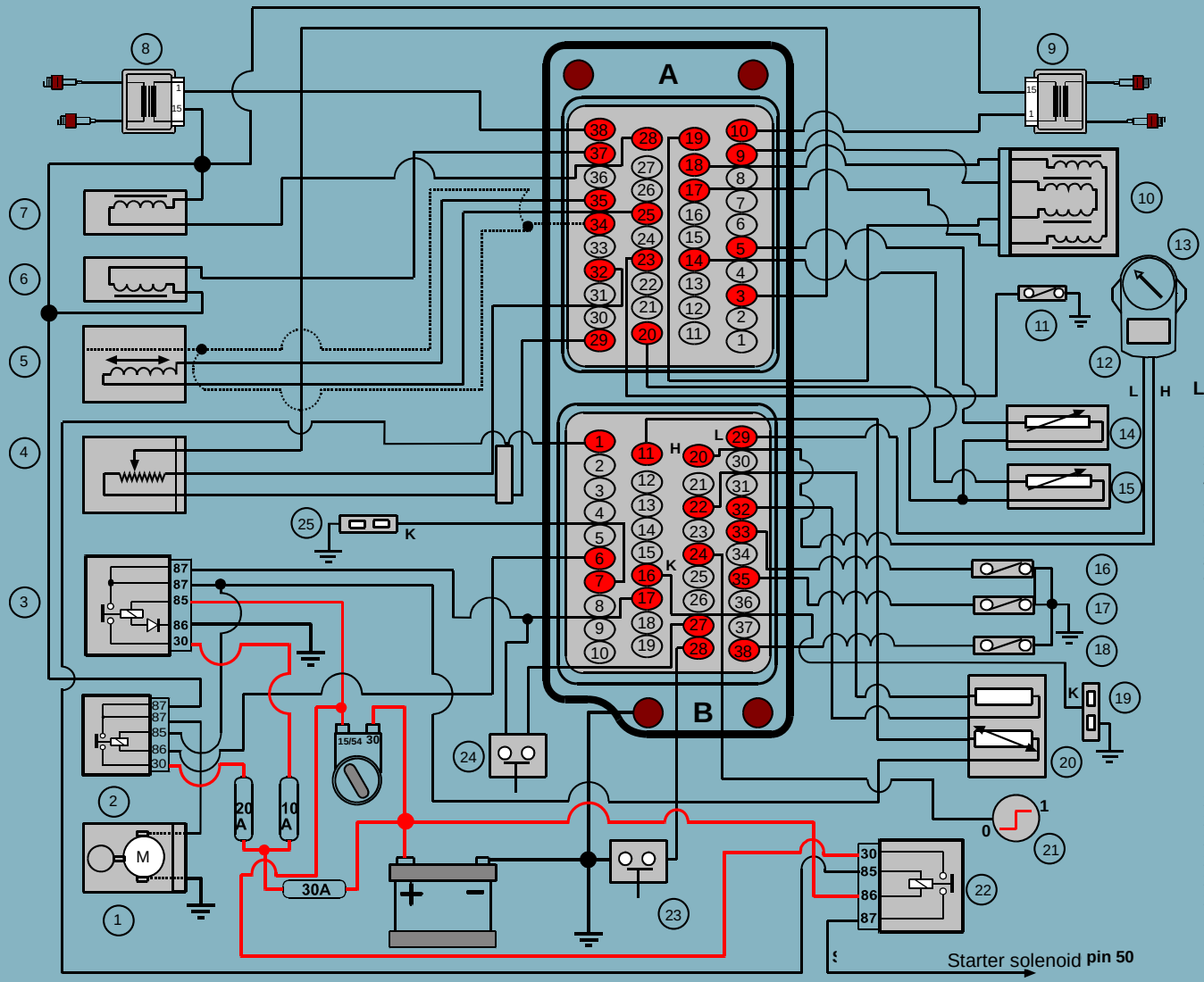
BREVA 1100 Security logic



Legenda

2 Clutch switch
3 Starter relay
5 Light switch RH
29 Main injection relay
25 Starter motor
31 Oil pressure warning
32 Neutral Gear switch in
34 Lateral stand sensor
50 Tip-over sensor

EWD: ENGINE ECU



electronic injection and ignition system Marelli 5AM 2

Moto Guzzi Breva 1100

Legenda:

1) Fuel pump
2) Secundary injection relay
3) Main relay
4) TPS
5) RPM/Phase sensor
6) Injector RH Cylinder
7) Injector LH cylinder
8) IgnitionCoil LH cylinder
9) Ignition Coil RH cylinder
10) Stepper motor
11) Neutral Gear sensor
12) dash w/ EFI warning light
13) Atmospheric air pressure
14) Air temp sensor
15) Engine temp sensor
16) Tip-over sensor
17) Clutch sensor
18) Stand sensor
19) Diagnostic connector
20) Oxygene sensor
21) Vehicle speed sensor
22) Starter Relay
23) Starter switch
24) Engine kill switch
25) Connector K-line ECU/dash

L= CAN low tension
H= CAN high tension
K= One way diagnosis