TECHNICAL BULLETIN No. 018-2008 **12-09-2008**

MODEL: All vehicles

SUBJECT: Project for electrical diagnosis improvement

Dear Dealer,

the analysis performed at our laboratory of the material replaced under guarantee and the daily contact with the customer service network have highlighted the need to provide a better support to the diagnosis/repair activities of electrical components.

We consider a priority to provide a better support on the following aspects:

- recharge system checks
- battery efficiency and recovery checks
- stator and regulator operation check
- anomalous absorptions

With that aim the following activities/equipment have been developed:

- **Training courses specific to 2008**
- **Battery charger with recovery function and charger maintenance**
- **Check list of recharge electrical system with multimeter check**
- **Diagnosis ammeter clamp**
- **Recharge system check with ammeter clamp**
- **Cable harness for recharge efficiency tests**

This group of activities have to become an opportunity to make Aprilia service network professionality grow and to provide its customers an excellent service

Possessing and knowing how to use the equipment, such as multimeter, ammeter clamp and battery charger with advanced functions, becomes, therefore, an **obligatory quality standard** for those assisting Aprilia vehicles.

In the attachments of this bulletin you will find information that will allow you to be immediately “operative”.

During the training courses that are being prepared, you will have the possibility to learn the theoretical grounds for a thorough use of the specific tools.

Regarding the activities above mentioned, in case of electric problems, Aprilia technicians will ask you to supply the observed data to the diagnosis stage.

Lack to provide these data will be considered “absence of diagnosis”.

In the following pages you will find:

1. Information on the star-shaped and triangle-shaped stators structure
   1.1 Information on the Multimeter and its use
2. Diagnosis procedure for recharge system check
   2.1 stator efficiency checking, integrity and resistance check
   2.2 stator efficiency checking, ground insulation
   2.3 stator efficiency checking, empty system operation
   2.4 stator efficiency checking, fully loaded operation
   2.5 absorption check with vehicle and panel off
3. Information on ammeter clamp and its use
   3.1 table of cables for stator short-circuit
   3.2 clamp characteristics
4. Information on battery charger and its use
   4.1 Recharge modality and battery preparation
   4.2 Battery charger maintenance and its use

CHAPTER 1 - Information on the star-shaped and triangle-shaped stators structure

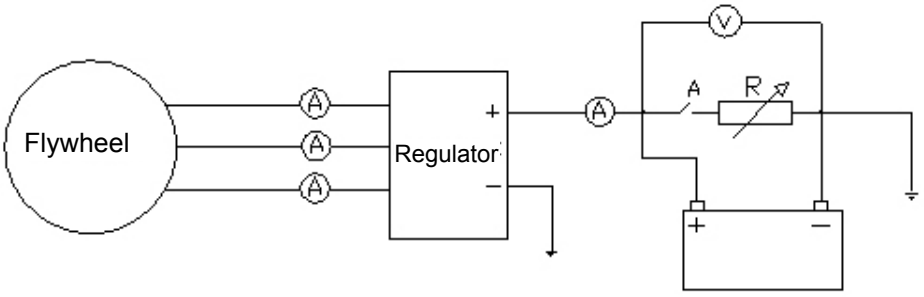
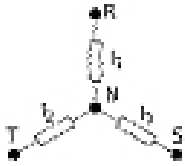
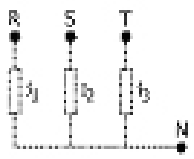


Figure 1 : Diagram of recharge system type

Star-shaped connection:



1) Star (symbol: Y)

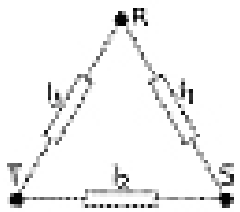


2) Star connection diagram

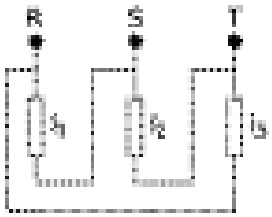
In star-shaped stators the star centre is electrically connected to the engine crankcase, therefore, to the ground. Using a multimeter to measure between each of the 3 outputs (phases) and the ground you can see the single winding resistance (equal to a few Ohm). You are then able to see if any of the 3 windings is open and KO. Notice instead the short circuit is difficult because since the winding resistance is so low, it is comparable to the short circuit resistance.
Placing the multimeter between two outputs, you can measure the resistance of two phases in series.

Triangle-shaped connection:

For the triangle-shape (that has no points connected to the ground), only the ground short circuit can be measured. So if the flywheel is good between any of the 3 outputs and the ground, an infinite resistance is measured. On the contrary, if the resistance is low that means that any winding touching the crankcase produces a short circuit in the ground.
With this kind of connection you cannot see if a winding is interrupted because if for instance we connect the multimeter between the points R and S of the 3° diagram of figure 2, and the winding between R and S is interrupted, the circuit closes between the other two windings (R->T->S), and the multimeter indicates a low resistance.
In both cases, to measure the total delivered current, it is necessary to pass through a three-phase bridge, that is, the regulator.
Afterwards, the regulator can be placed with the current clamp, and measure the total current delivered by the generator.



3) Triangle or delta (Symbol Ä)



4) Triangular connection

Connecting the 3 outputs together and using the cable harness supplied by Aprilia, a short circuit occurs in each of the 3 phases.
Under this condition each phase delivers the maximum short circuit current on a load equal for all 3 (the cable harness that precisely shortcircuits).

We are talking about a three-phase system that consists of 3 identical phases with identical characteristics.
If from the current measurement with an ammeter clamp, different values are measured, the insufficient phase can be detected.
Needless to say, the measurement must be quickly carried out because the flywheel with the phases in short circuit rapidly overheat and run the risk of getting damaged.
See Chapter 2 for method of execution of the tests described

ATTACHMENT 1.1 Information on the multimeter and its use

The choice must prevail on the autoscale instruments or alternatively, with the possibility of measuring:

1. alternating and continuous voltage in Volts with a measuring field up to 1000V
2. alternating and continuous current in Amperes with a measuring field up to 10A
3. resistance with a maximum field of 50.00MΩ
4. ON/OFF continuity with buzzer

possible optionals may be useful as it is temperature measurement, diode tester, protection fuses in current measurement of 10° and 400mA , lasting battery of at least 1000 hours and of easy replacement, self-extinguishing, protective antitheft casing

fig.1 digital multimeter Aprilia spare part code 020331Y

The Multimeter is a measuring instrument that involves different functions, defined as "measurement fields", in one single unit.
The multimeter measures electrical voltage, current and resistance.
Multimeters are divided into digital (fig.1) and analogue (fig.2). The first category shows the value measured on a display with seven LED or LCD segments, whereas the second category, more commonly used, displays the reading in an index that is moved over a graduated scale. The digital instrument, although more diffused, has not completely made the analogue obsolete.
Each tester has two lugs differently coloured and connected, through flexible conductors (cords), with double plugs. The black one must be always introduced in the common (COM.) bushing, while the red one, in the bushing marked with the symbol of the electrical dimension that is intended to be measured. The three more common scales, present in the same dial, refer to the resistive measurement of current and voltage.

fig.2 analogue multimeter

Fig.3 digital multimeter torque on the left side with manual selection and with automatic scale selection on the right side

CHAPTER 2 – Diagnosis procedure for recharge system check (for vehicles with “TRIANGLE” stator)

THE FOLLOWING PROCEDURE DOES NOT APPLY TO ALL 2-STROKE VEHICLES AND SXV-RXV 50CC AND 100CC 4-STROKE MODELS (because these vehicles have star-shaped stator)

CHECKING	MODALITY/ ACTIVITY
A	**VISUAL INSPECTION OF STATOR CABLE HARNESS**
Check that the cables that come out of the stator are not burned	To perform this check, make the sheath (if present) containing the cables run
Check if the thermoshrinking sheath presents signs of melting in the crimping area	If there are signs, **replace the stator**
B	**STATOR INTEGRITY CHECK AND RESISTANCE CHECK**
Check integrity and absence of oxidation of the contacts of the stator connector	If necessary, apply antioxidant on the contacts
Check stator cables continuity testing 2 cables at the time with engine off	The resistance measured must range between 0.1 and 1 Ohm. (see att.2.1) On the contrary case, **replace the stator**
C	**CHECK STATOR INSULATION TO MASS**
Check insulation of mass stator cables with engine off	The resistance measured between the yellow cables and the mass must be **OL infinite** (see att.2.2) On the contrary case, **replace full stator**

D	**EMPTY STATOR OPERATION CHECK (engine on at speed indicated on table 1)**
Check the alternating voltage present in the stator heads	Disconnect the connector between the stator and the main cable and measure the alternating voltage testing two cables at the time by using a tester. (see att.2.3 , and com. tech. ref. on Aprilia website n°31-2003 and n°58-2002) The value measured must be similar to the value reported in **Table 1** with a minimum admissible tolerance of ± 20% Otherwise: replace full stator ***WARNING: The same check has to be repeated when the engine is warm (5' at 5000 rpm)***
E	**CHECK FULLY LOADED STATOR OPERATION (with engine on and at operating temperature)**
Check the value of the current generated by the stator.	Disconnect the connector between the stator and the main cable, shortcircuit the stator with the appropriate cable and measure, with the ammeter clamp, the current of each cable. (see att.2.4). The values measured in each cable must be similar. On the contrary case, **replace the full stator**. ***WARNING: For a correct use of the ammeter clamp consult the corresponding attachment (att.3)***
F	**MAIN CABLE HARNESS CHECK**
Check integrity and correct housing of main fuses	Check integrity and correct housing of main fuses
Check the fuses for signs of overheat (melting of plastic parts) and oxidation in the tongues. Check that the system terminals under the fuse holder are correctly inserted.	On the contrary case, **replace fuse and/or housing.**

G	BATTERY OPERATION CHECK
Make sure that the vehicle remains inactive for at least one month with the battery connected.	If this condition is fulfilled, first of all, disconnect the battery and recharge it. Apply **BATTERY RECHARGE** procedure with the battery charger specific for the “flat” battery recovery and use it as required by the specifications reported on the Use and Maintenance Manual of the equipment
For lead batteries, check that the level of the liquid is between MIN and MAX notches	On the contrary case, top up the liquid with distilled water without going beyond the max level
Check that the battery clamps do not present marks of corrosion or deposits of contaminants.	If any of this is found, perform clamps cleaning using a metal brush
Check vehicle absorption with the key in off position	Disconnect the cable from the clamp of the battery positive pole. Using a tester connected in series between the cable and the clamp, make sure that value measured does not go beyond the 10 mA after 1minute (see att.2.5) The values of the current measured on some models are found in **Table 2.**
H	**CHECKING VOLTAGE REGULATOR OPERATION**
Check voltage regulator operation.	Turn on the engine and leave it running for 5' at 5000 rpm. Using a tester check the voltage in the battery heads. With the engine running at the speed indicated in **Table 1,** 12.8 -15 V approximately must be measured. On the contrary case, and after all previous operations have been carried out, **replace the voltage regulator.**
I	**CHECK ENGINE AT IDLE (see Table 3)**
Check engine at idle.	Idle speed values are found in **Table 3** with a tollerance of ± 100 rpm (with warm engine and water temperature > 75°C). If the idle speed is incorrect, detect the cause for the fault or where possible perform the correct adjustment

MODEL	Table 1		Table 2	Table 3
	rpm	Volt (V)	milliAmpere (mA)	idle speed (rpm)
Sport city 125 - 200	5000	60	1 - 3	1700
Atlantic / Scarabeo 125 - 200 - 250	5000	50	0 - 1	1600
Atlantic / Scarabeo 500	5000	50	1 - 4	1500
Pegaso 650	5000	70	1 - 3	1350
RSV 1000 ('04)	4000	60	1 - 4	1250
ETV Caponord	4000	60	1 - 4	1340
RST Futura	4000	60	1 - 4	1280
Breva 750	4000	65	3 - 9	1150
Scarabeo 125/200 Light	6000	90	0 - 1	1800
Shiver 750	4000	70	3 - 9	1540
Mana 850	4000	70	3 - 9	1240

ATTACHMENT 2.1 - Stator resistance check

The electrical resistance is the property that body have to oppose to the passage of electrical current; the resistance value will be higher and the current coming out of the body will be lower when it passes through body. **The test is carried out with the engine off and once the cable harness of the vehicle system have been disconnected.**
Values over 1Ohm or under 0.1Ohm may indicate melting nucleus of strings or burnings that alter the material conduit.

Key
Resistance Ω Ohm
1MΩ (1 Megaohm) = 1000 KΩ
1KΩ (1 Kilohm) = 1000 Ω

1 = Open Loop: open circuit or very high resistance

2 = selector positioning at 400 Ohm

3= place the negative terminal on COM and the positive one on Ohm and place the two tester terminals on two of the three cables leaving the stator following the logic of 1/3 then 2/3 and 1/2

4 = resistance 0.3 Ohm. Correct resistance

ATTACHMENT 2.2 – Check mass insulation (for vehicles supplied with "TRIANGLE" stator)

THE PROCEDURE REPORTED BELOW DOES NOT APPLY TO ALL 2- STROKE VEHICLES AND 4-STROKE 50CC AND 100CC SXV-RXV MODELS

The test is performed with the stator yellow cables disconnected from the vehicle system and with the engine off
Connect the black terminal on COM and the red terminal on Ω (Ohm), place the selector at 400 Ω.
The terminals are connected first to the vehicle mass and then on the engine **(black terminal) and the red terminal to each, one at a time, of the three stator yellow cables. Measure the following values of fig.1 (OK) or fig. 2 (NO)**

Fig 1 = Open Loop value (infinite /non measurable value) the stator is not grounded. This is not a fault

Fig 2 = resistance value, the stator is grounded, therefore, this is a fault

ATTACHMENT 2.3 – Empty stator operation check

Picture 1

Picture 2

Picture 3

This test measure the alternating current output of the stator, that is, the voltage in empty operation and not adjusted by the current rectifier. The test is carried out with the engine previously warmed up and at a determined speed (table 1 dedicated for each vehicle). Then disconnect the output cables the stator and, if necessary, keep contact with the pick-up (Quasar engines in picture 3); use the respective cable with connection dedicated and adapted to such purpose (spare part code AP8140940) disconnecting it from the connector picture 3.

Place the multimeter in a volts scale and select alternating current AC (picture 1 and 2) with a maximum measure not **lower** than 200 volts, place the multimeter black lug on a stator output string and the multimeter red lug on another stator string and measure; then, compare the results obtained with the table of the vehicle (picture 1 = Stator to be replaced, picture 2 = Stator OK).

The measurements of the three output cables of the stator are performed in pairs: 1 with 2 and then 2 with 3 and 3 with 1 next to the read value, the rule is that it must always be equal with slight decimal differences.

ATTACHMENT 2.4 – Fully loaded stator operation check

The following measurement must be carried out with Bicor 4 code. Aprilia AP8181061 ammeter clamp, connected to the Axone instrument and ACQ module.

ATTENTION: this ammeter clamp can be connected exclusively to Axone 2000, and can not be used with the new NAVIGATOR. If Axone is not used, a regular ammeter clamp can be used.

Depending on the vehicle to be measured there are cable harnesses dedicated to shortcircuit the three output strings of the stator with the aim of obtaining the maximum stator current supply.

The test cannot last for more than 30 seconds, to avoid ignition overheat and subsequent melting.

The measurement must be carried out either with the engine hot or cold and the ref. speed must be of a minimum of over 4000rpm.

Naturally, even if there will be no indications on the values because these are approximate, the rule is to have similar values in Amperes between the three strings at a minimum of over 4000 rpm and the values measured at 4000 rpm must be around 30/40% over those obtained at idle speed.

Clamp and Axone use procedure is included in the package.

ATTACHMENT 2.5 – Check of vehicle absorption with panel off

The following check aims at checking possible current absorption excesses from the battery to the vehicle elements, with particular reference to instrument panels with antitheft and injection ECU, components that continue to be fed even with the vehicle switched off .
The values that may be taken as reference generally range between 2/3 milliamperes (without antitheft system activated) and 8/9 milliamperes (with antitheft system activated).
However, even such low values may discharge a healthy battery in 10/15 dd, so the best solution is to equip the vehicle, whenever possible, with a battery charger prewired to the scooter system.

1. The absorption check test is only performed with the panel off because if the panel is on there are activations, such as the headlamps, that use great amounts of current of at least 8/10 ampere and the diagnosis instrument might get permanently damaged.

2. For the connection use black (COM) and red (mA) multimeter outputs, then use the selector on A (Ampere) selecting a field of 40 milliamperes.
3. Disconnect the negative cable from the battery (for safety reasons, operate on the negative cable), then place it again on the battery clamp with the two multimeter lugs connected one to the clamp and the other one to the negative cable.
4. Separate the negative cable with the lug from the clamp releasing the other lug on the clamp, the instrument panel will get activated (in some vehicles) and the multimeter reading will be adjusted; possible variations of 1 milliampere are allowed.

NOTE: for vehicles equipped with light in the boot and antitheft activation on the saddle switch, a weight must be laid on the switch in order to prevent the bulb and the antitheft device from switching on.

CHAPTER 3 – Information on the ammeter clamp and its use

WARNING: this procedure can be only performed in Axone 2000, and it is not possible to carry it out with NAVIGATOR

Use the **Ammeter clamp** (AP8181061) when the generator and battery check test, performed with the multimeter, have yielded positive results.
If the contrary occurs, the fault must be found in the cable harnesses and eventually in the voltage regulator.
A negative result of the test performed with the ammeter clamp implies the generator replacement if the damage is found in the cable harness between the connectors and the generator itself.

WARNING:

- The Axone must be connected to the 220 V network using a 1000 mA transformer. It is recommended to use the original transformer, available at the manufacturer (www.texa.it), since some merchandised transformers have the jack polarity inverted, and therefore, the hardware can result damaged.
- Use the ACQ module. In Axone kit
- The battery of the ammeter clamp is of 9 V. Its voltage **must not be lower than 7.5 V**, in this case an incorrect reading of the results may be obtained. A voltage lower than this value will yield an incorrect reading, the same will happen if the LED indicating “charged battery” on the ammeter clamp is on. Therefore, it is recommended to **check the full charge** of the 9V battery .

For a safer analysis, it is recommended to disconnect the battery from the clamp after each use and check the voltage before performing the test. When the battery is connected, the red LED of the clamp will flash and after the resetting, it will remain on. The activated LED indicates that the clamp is ready to be measured

CHECKING PROCEDURE:

Start the vehicle and wait until the operating temperature is reached:

- this temperature is reached when the cooling fan has run at least once. If the vehicle does not have fan/radiator, but has engine temperature control indicator, it needs to reach the 85°C. If these devices are not present, the vehicle can be started and left running for 5' at ¼ of the throttle grip rotation.

Prepare the diagnosis equipment.

- Connect the ammeter clamp using the cables supplied. For more details, consult the instructions manual of the ammeter clamp in kit with the clamp
- Set the Axone to: Battery Recharge → Diagnosis
- Follow the instructions displayed on Axone screen
- Once performed the preliminary instructions, the current (in Ampere) measured by the ammeter clamp will be able to be read on the display. When the instrument is not used, a value that can differ from 0.00 A will be read on the display, given that the ammeter clamp functioning is by means of magnetic induction and reacts to the equipment surrounding magnetic fields. Variations of few decimals do not affect the measurement. Variations over the unit may influence the result of the test, check then, that there are no sources of disturbance in the proximity of the instrument panel (radio, cellular phones, etc…), if negative, repeat Axone and ammeter clamp ignition operations.
- Select the test generator cable fitted to the type of connector present on the vehicle. This cable serves to shortcircuit the generator and depends on the type of stator fitted, not on the vehicle. According to the vehicle, there are 5 different cables available.

Section 3.1 - Table of cables for stator shortcircuit

CODE	DESCRIPTION	MODEL
AP8140940	Test generator cable 250 E3-500	500 cc / 250 cc i.e.
AP8140941	Test generator cable RSV-Pegaso VD	RSV 1000 ME RP RR / Pegaso Yamaha VD
AP8140942	Test generator cable Pegaso RW	Pegaso Rotax RW
AP8140943	Test generator cable 125 -200/250 E2	Leader 125-200 engines/ Quasar 250 E2 engines
AP8140944	Test generator cable Breva 750	Breva 750

The cable is mounted on the connector coming from the generator. Some models have the connector very near to the voltage regulator, whereas some other models have an extension between the generator connection and the voltage regulator connection. It is recommended to use the connector closer to the generator: on the contrary case, the cause for the malfunction may be assessed between the cable harness and/or the intermediate connector

Then, carry out a visual check of:

- connector
- terminals oxidation
- correct introduction of terminals in the connector

Relative to the cable harness between the 2 connectors check:

- cables continuity
- cables mass insulation

Once reached the desired temperature:

- stop the vehicle
- disconnect the connector
- connect the correct shortcircuit cable see ATT. 2.3

NB: The test has to be carried out in 30''after the vehicle has been restarted. Longer time intervals may damage the generator due to overheating.

- restart the vehicle
- use the ammeter clamp on each one of the cables of the test cable and read the value of the current that passes through and the graphic underneath the Axone display.
- Stop the vehicle.

Compare the values of the current measured in the cables of the test cable. They must be in the same value range and differ maximum few Ampere decimals. The graphics underneath must have a regular course (Fig 1). More significative current rating variations and/or irregular graphics where irregular curves are evidenced (null current rating indications between the peaks and the grooves of the curve), signal a generator malfunction and, therefore, a negative test (Fig 2)

Range of current values: 11÷25 A (fig 1 and 2 are only examples of values measured in 4T models with engine capacity superior to 250 cc).

Fig 1

Fig 2

Section 3.1 – Characteristics of Code AP8181061 calliper

Capacity 1V/A

Measurement range 0-3°
Troubleshooting 100mA
Precision +/-5%

Capacity 0.1V/A

Measurement range 0-30°
Troubleshooting 10mA
Precision +/-5%

Passband:1KHz
Working Max voltage:50V
Installation category CAT1
Working temperature from 0°C to 40°C

1604 Alcaline 9V battery
Battery duration :16 regular hours
Flashing LED with battery under 7V outlet

Reference standards : EN61010-2-032
Input impedance >100Kohm

Conductors maximum diameter 18mm
Shoe opening 22mm
Weight 200g

CHAPTER 4 - Information on the battery charger and its use

To help in diagnosis operations and normal management of battery recharge activation, the battery charger has already been positively tested and validated:

020648Y

available as spare part

The list price can be consulted by the regular spare parts management procedure.

Minimum requested characteristics

As an alternative to the product recommended, manufactured by TECHMATE specifically for Yuasa batteries, you may use a professional battery charger that foresees charge, maintenance and battery recovery functions.
Non professional or hobby battery chargers do not guarantee optimal performances so they must not be used.

The basic characteristics are:

1) Free acid, MF and gel battery charger.

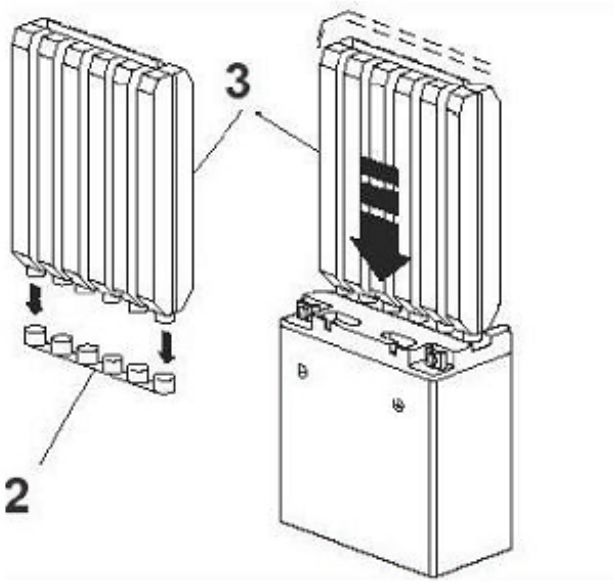
2) Battery state check: battery setting under stress procedure and pickup test

3) Battery recovery: battery desulphatation procedure that foresees charge currents up to 25Volts

SECTION 4.1 - Recharge modality and battery preparation

1. Liquid injection process.

- Lay the battery on a flat surface.
- Remove the adhesive for protection from the cell.
- Take the acid container and remove the cap 2 from container 3 (the cap will be useful to close the battery afterwards)



- Place the upside-down container parallel and perpendicular on the battery lining up the outputs with the six cells of the battery.
- Press the container until its seals break. The liquid will start to flow in the cell.
- Check that the air bubbles come out of the cell and allow the liquid to flow in the cell for at least 20 min.
- If air bubbles do not come out of the container and the liquid does not flow, slightly beat the bottom of the container until the liquid begins to flow in the cell. **Never remove the container from the battery, perforate or cut it to make the liquid flow more easily**.
- Make sure that the liquid container is completely empty before removing it

- **Let the battery rest for at least 1 hour before starting the charge process. Without closing the six cells, rest it without closing the caps of the six outputs. This operation is essential to get the best long-lasting performance of the battery: compressed gas will evaporate without liquid leaks**

WARNING: lack to carry out the resting phase after acid top up, will lower the maximum charge available and will not allow the acid to complete the gelation procedure. In this case the battery might loose acid if it is tilted.

2. Charge process

- This battery type requires an initial charge process before installing it on the scooter.
- During the charge process, the closing cap must remain rested on the holes of the cell, without being pressed. This operation is important to avoid excessive acid evaporation, but at the same time to allow a minimum evaporation for the disposal of protection substances that cover the plate.
- If the charge is performed with an automatic battery charger, check that the battery charger (A) current is the same or higher than the battery capacity.
- If a battery charger with constant charge is used do as indicated on the body of the battery (e.g.1.2A for 5-10 hours).
- Once finished the charge process, firmly press the cap into the battery holes until it closes perfectly. At this point the battery is considered sealed and the cap must not be removed during the whole life of the battery.
- Using a voltmeter check battery voltage after the charge. The voltage measured must be of at least 12.8 V, if it is lower the battery will need further charge.

3. Important precautions

- Do not use acid different from the one contained in the charge attached to the battery.
- Drain the whole content of the charge into the battery cells following the same criterion, without never adding other acids.
- Once the battery has been topped up and closed, do not ever remove the sealed cap with the aim of adding liquid and certainly not during the charge process.

4. Maintenance charge table

If the scooter is not used for long periods or just occasionally the battery voltage has to be checked daily following the table values mentioned below.

5. Charge instructions for batteries with voltage <11.5 V

If the battery, checked with a voltmeter, has a voltage lower than 11.5 V, it
might be that the battery has an excessive internal resistance that does not allow it to be charged
to the regular battery charger (16-17 V) voltage.
Before the diagnosis that the top up is not possible try to charge it following
This method:
Connect the battery to the charger set to 25 V (*) and charge it for app. 5 min.

CHARGE STATUS	VOLTAGE MEASURED	OPERATION	CHARGE TIME
100 %	12.8 – 13 V	no charge	
75-100%	12.5 -12.8 V	slight charge	3-6 h
50-75%	12 -12.5V	charge	5-11 h
25-50%	11.5-12 V	charge	13 h
0-25%	11.5 V or less	charge	20 h

(*) Not all chargers have this specific function. In charger coded 020648Y, this function is specifically arranged by a battery top up condition, high voltage for a very short and defined time tendsto“sweep “ the internal components to restore the original characteristics. Therefore, avoid, when not safe, charging with higher voltages and for periods over 5 minutes.

If the charger ammeter does not show variations after the 5 min. of charge, the battery can not be used any longer.
If the ammeter shows variations it means that the current has started to flow, program the battery charger at the normal level and charge the battery as reported above.
30 min after the charge process ended, measure the voltage in the poles using a voltmeter and following this table.

Voltage	Assessment
12.8 V or more	can be used
12.0 -12.8 V	insufficient charge - resume regular charge procedure
12.0 V or less	battery can not be used anymore

6. Installation

- Eliminate possible signs of acid in the battery, and while restoring it to its place, pay attention that the ignition key of the vehicle is OFF
- Connect first the positive cable (+) then the negative (-), being careful to place a grover type washer on the poles between the ground lead eyelet and the screw.
- Fasten the screws at the prescribed torque to avoid equivocal contacts.
- Use neutral grease or petroleum jelly to grease the battery terminals.

SECTION 4.2 Battery charger maintenance and use

Maintenance for Aprilia battery code AP8707120

The following accessory is very useful for vehicles that are not used for long periods, do not charge the battery but keep the charge status at an optimal level and especially if the vehicle under consideration is parked with active absorption such as instrument panels and antitheft systems.

The application has a cable harness dedicated to the battery for a faster application on one side, whereas the other side is connected to a domestic plug socket. On the upper part there are 3 LED warning lights that display the battery charge value.

NOTE: Make customers aware of the battery correct maintenance procedure as suggested on the use and maintenance manual