

Fitting Instructions

Thank you for choosing a Newtronic contactless optical ignition system. The Newtronic ignition kit replaces the contact breakers in Benelli Sei and other 6 cylinder Benelli models with more reliable and precise optical switching that will eliminate almost all ignition timing maintenance.

The fitting instructions are quite long but very detailed and for a quick and successful installation it is recommended you read them all the way through and familiarise yourself with the parts provided in the kit.

INSTALLATION NOTES:

The Benelli Sei sometimes uses different coloured wires to those shown in the service manuals. Therefore **IT IS IMPORTANT** you double check you are making the correct disconnections and connections regardless of presented wire colours (the wiring colours used in these instructions are correct for a 1976 Series I model)

Benelli used a non-standard bullet connector which can be adjusted to work with the supplied connectors. However, the kit includes a standard bullet connector to replace the Benelli connector should you prefer.

It is recommended you have a 23 mm socket before beginning installation.

1. INSTALLATION PREPARATION:

- 1.1. Remove the two cotter pins and retaining clips from the seat and remove it from the bike.
- 1.2. Disconnect and remove the gas tank.
- 1.3. DISCONNECT THE BATTERY positive (+) and negative (-) connections..
- 1.4. Remove both the left-hand and right-hand side body panels.
- 1.5. Underneath the gas tank release the plastic ties holding the wiring harness to the frame. This also allows access to the positive (+) coil connections and the three-wire harness going to the points.
- 1.6. Remove the right-hand side cover to reveal the timing assembly.
- 1.7. Release the contact breaker wiring harness (but do not remove at this point) along the frame and the right hand side of the motor. The thin metal straps holding it should be carefully unfolded as they will be reused later.
- 1.8. Remove the 10 mm retaining bolt from the centre of the advance shaft retaining nut (a 23 mm nut with an incorporated washer bearing surface).
- 1.9. **BEFORE DISCONNECTING ANY CONTACT BREAKER CONNECTIONS;**
 - WRITE DOWN the cylinder pairs (1&6, 3&4, 2&5) and the colour of the wire connected to them (normally the wire colours are Blue for 1&6, Red for 3&4 and Yellow for 2&5 – but they may be different on your vehicle).
 - CONFIRM that your written notes for the colour coded wiring harness agree with the actual spark plug lead pairs coming from the three coils (1&6, 3&4, 2&5). Always use the actual spark plug lead locations as the final word in determining what cylinders a particular coil is firing.
 - MAKE SURE you keep this list in a safe place as you WILL need it later..
- 1.10. Disconnect the contact breaker wires, remove the three retaining screws in the outer slots of the Sei timing plate and remove it.
- 1.11. Remove the three cylindrical condensers formerly covered by the plate.
- 1.12. Carefully slide off the cam lobe from the advance shaft (a tube-like piece of hardened steel). Notice how the advance bob weights engage two slots at the bottom of the cam lobe. You will need to rotate the lobe slightly to disengage a retaining dowel from the interior before removal. This retaining dowel is important to the correct installation of the Newtronic rotor.
- 1.13. Remove the three-wire harness from the contact breakers up to the coils. Remove and retain the 'U' shaped rubber grommet sealing the harness entrance into the engine casting timing area.

2. NEWTRONIC IGNITION INSTALLATION

- 1.14. Install the Newtronic switching unit in the battery area using the sticky pad provided.
- 1.15. Feed the connectorised end of the Newtronic lamp assembly harness up through the frame and alongside the motor. Try to use the pathway of the old harness.
- 1.16. The three lamp housings on the assembly are the triggers for the coils firing cylinder pairs 1&6, 2&5 and 3&4, The trigger for cylinders 1&6 is the first lamp housing on the harness, 2&5 is the middle one and 3&4 is the last lamp housing at the end of the harness. The lamp housing are screwed to the Newtronic timing plates on top of a number of spacer shims. Changing the shims will raise or lower the height of the housings with respect to the trigger wheel blade and the correct number of shims must be selected to allow the blade to pass cleanly through the lamp housing slot with an acceptable level of clearance above and below.

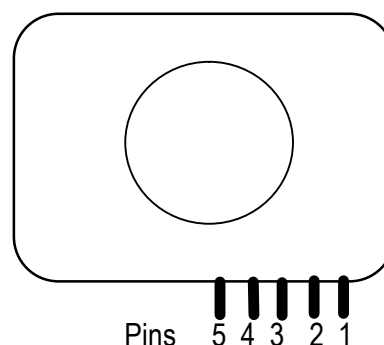
The Newtronic timing plate is pre-assembled with one thick shim and one thin one. This is likely to give the correct height for each housing but blade clearance must always be checked on installation. If the shims need to be added to or removed follow the instructions in the following section.;

- 1.17. First, note the way the system is assembled. A washer should always be used between the screw head and the lamp housing body with care taken not to over-tighten the screws.
 - Remove the screws from the 1&6 lamp housing taking care not to lose any of the parts. Select the required shims and thread a washer, the lamp housing and the shims onto the first retaining screw. Offer the part assembly up to the first hole in the Newtronic timing plate and thread the retaining plate onto the screw. make sure that the machined grooves on the retaining plate can be seen and tread on the nut. Thread all the parts onto the second screw and securely tighten both screws (making sure both nuts have slotted into the machined groove in the retaining plate).
 - Install lamp housing 2&5 in a similar matter EXCEPT that the screws are not fully tightened. The nuts need to be tight enough to be located in the machined groove but this lamp will be adjusted during timing and must be able to be moved and tightened up later.
 - BEFORE installing the final lamp housing place the Rotor into the centre of the plate and turn it until the blade rests inside the previously installed housings (the Rotor CANNOT be fitted later). Then install housing 4&3 using the same method as for 2&5 making sure it can be moved. The assembled plate can now be offered up to the advance shaft.
- 1.18. Check that the advance bob weights can move freely, put a drop of engine oil on each of the pivot points and a light coating of synthetic grease on the advance shaft and squared bob weight ends.
- 1.19. Follow these instructions exactly:
 - One of the slots on the rotor shaft has a white dot above it. This slot must be installed over the dowel retainer on the advance shaft
 - The ends of the advance bob weights must be engaged in the two rotor body slots. This is be done by using a light pressure on the rotor and then reaching behind with a thin screwdriver or similar tool to moving each weight into position in turn (the light pressure is needed to overcome the spring tension trying to move the weight back to its rest position
 - When both weights have been engaged the Rotor may be pushed in a few more mm and rotated to its rest position.
- 1.20. Rotate the timing plate assembly until the circular timing window (1&6) is at the top. The slots around the edge are offset and if the plate has been installed correctly there be an equal amount of adjustment for each. Engage the three retaining screws and leave them loose enough for the timing plate to be rotated. Place a very light coating of synthetic grease on the Rotor side of the 23 mm retaining nut and refit the nut and 10mm retaining bolt to the advance shaft and tighten.
- 1.21. Double-check the rotor moves back and forth freely. If it cannot then check that:
 - The bob weight ends are properly engaged;
 - The right number of shims are fitted on all housings
 - The timing plate is installed correctly;

- 1.22. ONLY when all the above have been done check if the rotor body length is slightly too long and is fouling on the retaining nut. If so this can be corrected by careful sanding or filing of the end facing the retaining nut (NOT the slotted end) and re-assembling.
- 1.23. Replace the 'U' shaped rubber grommet over the harness where it enters into the engine casting.
- 1.24. Install the new four-wire harness from the Newtronic switching unit to the coils under the gas tank. The harness multi-connector plugs into the switching unit and the other end with the four wires (white, blue, red, yellow) going to the coil area.
- Note: The Newtronic harness is fitted with standard bullet connectors. Some of the connectors on the Benelli may not be of the same size and if so they might be lightly crimped to make them fit or by removing the Benelli connectors and crimping on the supplied replacement bullet connectors.
 - Locate the vehicle White wire that connects to all three coils. This is a common positive (+) ignition switched power supply. There should be a bullet connection just before it splits into the three coils. Undo this bullet connector and insert the White wire in the Newtronic harness using the 'T' connector provided. This provides the positive (+) power supply for the new ignition system.
 - The Blue wire in the Newtronic harness is connected to the Green wire coming from the coil for cylinders 1&6. Double-check the correct coil is chosen.
 - The Red wire connects to the wire coming from the coil for cylinders 4&3. Double-check that the correct coil has been selected.
 - The Yellow wire connects to the wire coming from the coil for cylinders 2&5. Double-check that the correct coil has been selected.
- 1.25. Secure all the wiring with the supplied plastic ties. On the side of the engine case gently refold the metal retaining strips over the new harness. Make sure there is some slack near the timing plate to allow for timing adjustment. The small connectors on the end of the harness should be fitted into the connector shells as detailed in the table below..

PIN	Lamp unit Wire colour	Cylinder	Main loom Wire colour
5	BLACK	2-5	YELLOW
4	WHITE	4-3	RED
3	BLUE	1-6	BLUE
2	YELLOW		
1	RED		

Front of Switching Unit Case



- 1.26. Fill the two halves of the connector with the waterproof putty sealant, and connect the assembled shells to the Newtronic box with the small self-tap screws provided.
- 1.27. Connect the Blue lead from the Newtronic ignition box to the negative (-) battery terminal and reconnect your positive (+) battery leads. There is a sufficient amount of extra harness length to allow you to install the Newtronic ignition box somewhere in the battery compartment area (using the adhesive backing) or simply leave it unattached but tucked safely away so that it will not move around in use .

Note 1. **It is recommended that a 23mm socket be used for turning the crank by means of the retaining nut on the advance shaft.** Using an open-ended wrench is very risky as the plastic lamp housings extend up into the path of the turning wrench and would be easily damaged if hit. The use of a socket minimizes the risk of catching the side of these lamp housings

Note 2. **There are a number of very important differences between the Newtronic replacement timing plate and the original SEi timing plate.** Note that the lamp housings are located 120 degrees counter-clockwise from the original contact breaker location (e.g. the lamp for 1&6 is located where the contact breakers for 2&5 was on the Sei plate). **However, the original timing window locations are still used.**

This can be confusing but although the trigger positions have been moved *the phasing of the timing windows have not.*

2. Timing your Newtronic ignition.

Please note that the leading edge of the rotor blade starts charging the ignition coil when it breaks the beam of light and the trailing edge 'Fires' the coil as it moves past the optical switches and re-makes the beam. The first timing window to be used is circular (1&6).

- 2.1. Rotate the engine until the '1' mark next to the 'F' is exactly in line with the '1' mark on the engine casing and switch on the ignition.
- 2.2. Release the three retaining screws on the perimeter of the advance plate are loose enough to allow rotation. Slowly rotate the plate until the left most LED on the ignition box (when the Newtronic logo is right-side up) JUST goes out. Tighten the screws. If 1&6 is correctly timed a slight jiggling of the rotor should cause the LED to blink on and off. Switch off the ignition
- 2.3. Rotate the engine clockwise to the next oblong timing window and bring the '1' mark next to the 'F' exactly in line with the '1' mark on the engine casing. Check the lamp housing screws for cylinders 3&4 (the next trigger clockwise from 1&6) are just loose enough to allow adjustment of the lamp housing. Slide the housing back and forth until the middle LED on the ignition box JUST goes out. Tighten the lamp housing screws, making sure the top of the lamp housing clears the retaining nut on the rotor shaft.
- 2.4. Rotate the engine clockwise to the next oblong timing window and bring the '1' mark next to the 'F' exactly in line with the '1' mark on the engine casing. Check the lamp housing screws for cylinders 2&5 (the next trigger clockwise from 3&4) are just loose enough to allow adjustment of the lamp housing. Slide the housing back and forth until the middle LED on the ignition box JUST goes out. Tighten the lamp housing screws, making sure the top of the lamp housing clears the retaining nut on the rotor shaft.
- 2.5. If at any time the rotor interferes with either the Lamp housings or the Rotor shaft retaining nut **FIND OUT WHY AND CORRECT IT BEFORE ATTEMPTING TO START THE ENGINE.**
- 2.6. Your engine is now statically timed and after re-installation of the gas tank, seat, and side panels it should start right away when an stroboscopic timing light may be used to check the settings dynamically.

CONGRATULATIONS!

You have installed your Newtronic ignition system and can expect many miles of smooth, precisely timed and maintenance-free enjoyment of your vehicle.