Dealer Service Manual

Maintenance and repair Instructions

Wisper Electric Bicycles

March 2011 1st edition

Contents

Section 1: Scope

1. This manual covers the fault finding procedures, maintenance and repair of all variants of Wisper bikes produced during the period 2008 to 2010 including 705, 805, 905, 706, 806 and 906 models.
2. It is intended to be used by authorised Wisper bike dealers to assist with the maintenance and repair of Wisper electric bikes particularly the electrical aspects of the bikes. It does not cover aspects of routine maintenance which would be similar to those for a non-electric bike such as adjustment of brakes, gears etc. These aspects are covered in the Wisper user manuals and in other standard bicycle publications.
3. It does not cover operating instructions that are covered in the Wisper user manuals and hence this manual must be used in conjunction with the relevant user manual.
4. Suitably qualified technicians holding recognised cycle industry training qualifications should conduct all repairs. Suggestions for suitable training are included in section 18 of this manual. If in doubt contact the Wisper Service department.

1 Section 2: Overview of Wisper models and key features / differences

1. The key model identifying features are listed in annexe 1 to this manual to assist with identifying model variants and associated repair procedures described later in the manual. This information also can be used for parts ordering purposes (see section 16 for further details on parts ordering).

2. The key distinguishing features amongst the models are battery type, operating voltage, front connector box (fcb) type (either 3 hole or 5 hole if fitted), hi lo box or handlebar display if fitted, and wheel motor / rim type.

3. It is strongly recommended that the user of this manual checks any bike presented for service against this information in order to ensure the correct procedures and parts are used.

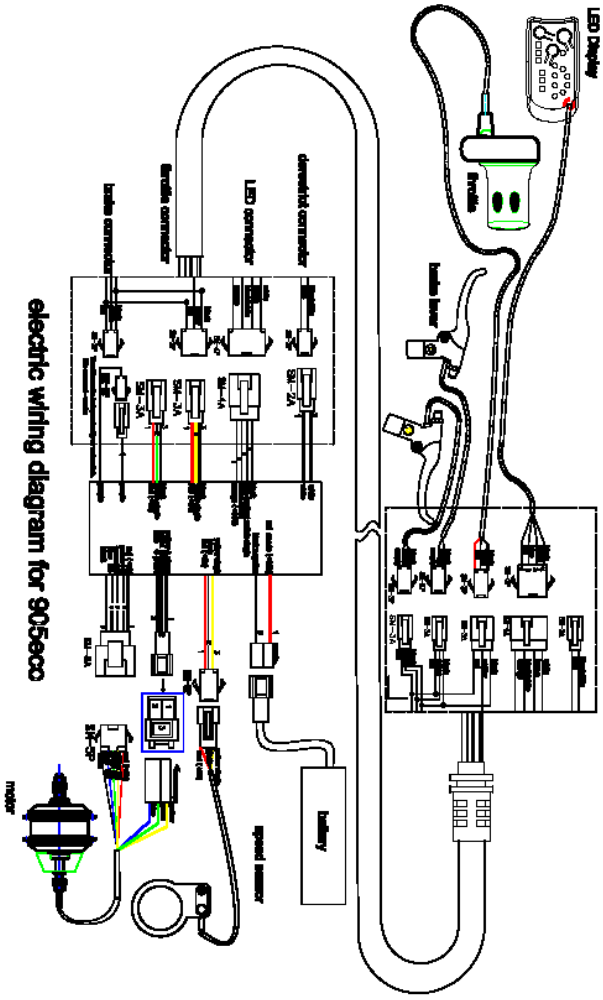
4. NB: The information in the annexe does not cover the complete specification for the bike but provides enough detail to identify the model type.

5. NB: If bikes are presented for service that do not match the criteria in the annexe please contact Wisper service department quoting the frame number for advice and confirmation that it is a genuine Wisper bike.

2 Section 3: Description of main electrical system control components

1. This section describes the main electrical system control components (excluding battery and motor) used in Wisper bikes including throttle, handlebar display types and functions, de restrictor button, brake cut outs, pedelec sensors, controllers, followed by simple procedures for testing individual components (off the bike) and correct installation arrangements.

2. The image below shows a typical set of electrical components for a 2010 905 model bike and generic wiring configuration. Further wiring diagrams are included in Annexe 2 of this manual:



2.1 Throttle

1. Wisper throttles are all of the Hall effect type with an output (control) voltage ranging from 0 to 5 volts.

2. Depending on the age of the bike and operating mode selected by the user throttles can either work independently of the pedelec function (i.e. work without the rider turning the pedals) or may only work in pedelec work which requires the rider to be pedalling. This aspect is covered further in the user manuals and in the fault finding procedure section of this manual.

3. Furthermore in 2010 model bikes the independent use of the throttle is limited to 4mph (6 kph) (walk along mode). These functions are controlled by the connection or disconnection of the 2 single purple wires at the controller located below the battery. Bikes will normally be supplied set up to meet the requirements of national legislation and any modifications may render the bike illegal for use on public roads.

4. Throttles can either have a full-length cable running back to the control box or on the newer models a short cable connecting into the front connector box (fcb).

5. Throttles with a long cable incorporate a red on / off latching push switch and can have either 3 separate wiring connectors or one 6-way connector.

6. Short cable throttles utilise one 6 way connector and may include an on off switch depending on the model year.

7. Throttle twist grips can be full length or half-length and are normally mounted on the RHS handlebar. On Alpino models they are mounted on the LHS and cannot be interchanged with RHS throttles.

8. Typical throttles are shown below:

Early type throttle

Used on late 2008 model bikes

2009 onwards, later models without the red on /off switch or battery indicators

Alpino models with L.H. throttle

9. Testing (throttle taken off the bike) is limited to the red on / off switch in throttles equipped with this feature. To test this switch un plug the wire(s) leading from the throttle at either the fcb or controller. Connect a multimeter set to a continuity or Ohms range across the two terminals connected to the brown and yellow two pin connector if equipped with 3 connectors or the first two pins of the 6 way connector (brown and white). The meter should show 0 ohms or infinity when operating the switch on and off. Failure of this switch will disable the bike.

10. No other testing of throttles apart from checking connections is practical without more specialised equipment and they should be replaced with genuine Wisper parts if found faulty following correct diagnosis procedures in the fault finding sections 7 and 8.

11. However as most problems are caused by connections these should always be checked carefully first before suspecting a faulty component. The image below show a typical connection problem normally caused by cables being strained or corrosion caused by

extreme weather conditions. The brown wire pin insert has been pushed back out of the connector body resulting in no power to the bike.

12. Extreme care should be taken when installing or adjusting throttles to ensure the spring return mechanism is not impaired. The throttle must close smoothly and quickly when released. For full length throttles ensure that the end the handlebar is not pressing against the inside of the throttle operating sleeve and that there are no burs on the handlebar. If the throttle is pressing on the end of the handlebar simply slacken the throttle clamping screw and slide the throttle 2-3 mm towards the end of the handlebar to provide clearance.

13. For half-length throttles ensure the plastic top hat spacer is properly located between the ½ grip and the throttle. See image below:

2.2 Handlebar display types and functions:

Wisper bikes use five types of handlebar display:

2.2.1 Battery charge indicator status lights housed within the throttle assembly on early model bikes

2.2.2 Separate battery charge status indicator unit mounted on the handlebar (early 806 models)

2.2.3 Hi Lo selector switch fitted to late 2008 and 2009 model bikes to control level of power assistance (20% and 80%).

Early bikes default to a low power setting on start up but later bikes default to a high power setting. Failure of the switch will not normally disable the bike and the bike will default to a maximum power mode.

2.2.4 LED type display fitted to 2010 models.

This type of display shows the battery charge status and also incorporates the power level assistance selector switch (3 levels), the light switch and the main on off switch.

2.2.5 LCD display fitted to Alpino bikes

An LCD display is fitted to Alpino model bikes incorporating the main on off switch, power assistance level selection (5 levels), battery charge status, plus power usage, speed and time information. This display also incorporates built in diagnostics to assist with faultfinding and this should be used in accordance with the instructions in the user manual and later in section 8 of this manual.

NB: The light switch incorporated in this unit controls the display backlight and not the main bike lists

LCD display fitted to Alpino models

No testing of displays apart from checking connections as described in the throttle section above is practical without more specialised equipment and they should be replaced with genuine Wisper parts if found faulty following correct diagnosis procedures in the fault finding sections 7 and 8.

2.3 De restrict button

1. The green de restrict button is fitted to the left hand side of the handlebars and the wires connected into the front connector box (fcb)

2. The green button works as follows:

3. When the button is pushed and latched ”in” the bike is restricted to the statutory maximum speed of 15.5mph (25kph) above which power will be cut to the motor to limit the speed.

4. When the button is pushed again and the button released the bike is derestricted and should only be used off road in that position. This allows for an approximate increase of 10% in the speed limit before the power is cut to the motor. It does not provide more power but simply controls the speed at which power is cut.

5. Each repeated push changes the operating mode from one mode to the other.

6. De restriction is not possible on some eco models fitted with smaller capacity batteries due to the higher battery usage expected and consequent effect on range when used in de restrict mode.

7. Further information on fitting is included in section 12.

8. The green button can be tested in a similar way to the throttle mounted on / off switch. To test this switch un plug the wire leading from the switch at either the fcb or controller and connect a multimeter set to a continuity range across the two terminals connected to two pin connector. The meter should show 0 ohms or infinity when operating the switch on and off. Failure of this switch will not disable the bike and the bike will default to an un-restricted mode.

2.4 Brake cut outs

1. These switches are installed within the brake levers on all Wisper bikes to comply with legal requirements and to protect the motor. Power is cut to the motor when brakes are applied.
2. The images below show typical levers and wiring arrangements.

2008 onwards using a 3-wire type switch

2010 model bikes using a 2-wire switch

3. Two types of switches are fitted either incorporating a simple on off switch with a two-wire connection or a Hall effect transducer indicated by 3 wires at the connector.
4. To test a two wire type switch un plug the wire leading from the switch at either the fcb or controller and connect a multimeter set to a continuity range across the two terminals connected to two-pin connector. The meter should show 0 ohms when the brake lever is operated (pulled in) or infinity when in the normal riding mode.

No (off bike) testing of the 3 wire type apart from checking connections as described in the throttle section above is practical without more specialised equipment and they should be replaced with genuine Wisper parts if found faulty following correct diagnosis procedures in the fault finding sections 7 and 8.

5. Failure of either type into an open circuit (infinity) state will not disable the bike but will render it unsafe to ride and the faulty component must be replaced with a genuine Wisper part.
6. Failure of either type into a short circuit (0 ohms) state will disable the bike and the faulty component must be replaced with a genuine Wisper part.
7. When testing the brake cut out switches installed on or off the bike the sensitivity should be checked as overly sensitive brake cut out switches can lead to erratic bike operation and intermittent loss of power. It should be possible to pull the lever sufficiently to leave a gap of 2-3 mm at the brake cable anchoring point between the lever blade and the housing before the switch is activated. See image below (the gap has been exaggerated for illustrative purposes):

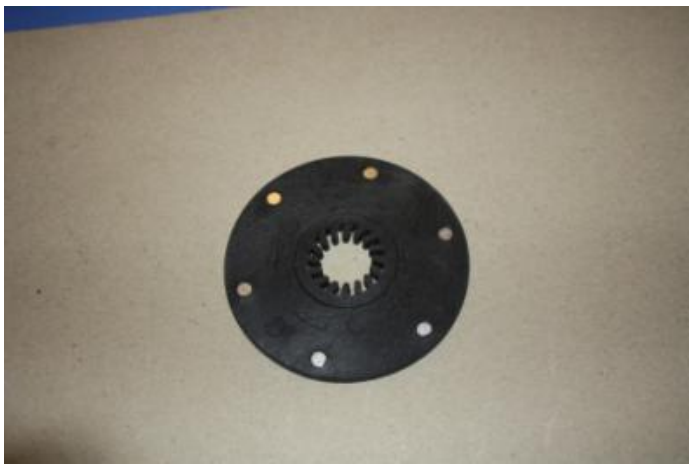
2.5 Pedelec sensors

1. These sensors are fitted to the bottom bracket (axle and frame) and control the operation in pedelec mode by detecting the rotation of the pedal cranks. A typical sensor set up is shown below:

2. The assembly comprises a disc containing 5 or 6 magnets that is fitted to the bottom bracket axle and rotates with the pedal cranks, and a fixed sensor fitted to the frame.

3. The sensor must be adjusted such that there is a 1-2 mm air gap between the tip of the sensor and the magnet disc and that the sensor tip is on the same radius as the magnets. If the gap is too large there will be no power in pedelec mode (and possibly no power in throttle mode depending on the way the operating mode for the throttle is configured) or operation of the bike will be erratic. Care should be taken to ensure the sensor bracket is not bent or misaligned. Always check the gap is consistent for a full 360-degree rotation of the pedal cranks.

4. When replacing the disc care should be taken to observe the direction of rotation arrows marked on the disc. Ensure all 5 or 6 magnets are in place in the disc. There may be some spare holes in the disc on early bikes, which is quite normal.



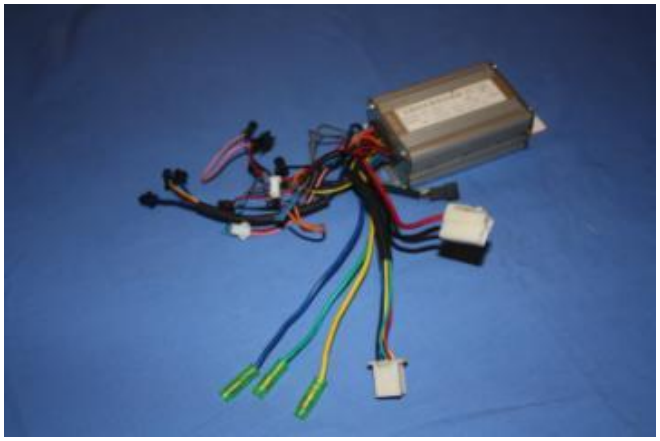
As this disc is a friction fit on the bottom bracket axle it can be easily moved along the axle to achieve the correct air gap above but care must be taken not to allow lubricants or similar fluids to contact the disc as this could cause slippage of the disc on the shaft.

5. No testing of the sensor off the bike apart from checking connections as described in the throttle section above is practical without more specialised equipment and they should be replaced with genuine Wisper parts if found faulty following correct diagnosis procedures in the fault finding sections 7 and 8. The sensors are however vulnerable to damage and corrosion being in an exposed position and a careful visual check should be made for these potential problems.

6. When ordering spare sensors ensure that the correct male or female wiring connector is specified, as there are variations amongst models.

2.6 Controllers

1. All Wisper bikes utilise a controller, which incorporates all of the inputs from the above devices and the battery and provides a regulated DC power output to the motor. Three typical controllers are shown below:



Early 2008 model controller with separate motor connectors

2008-2009 type controller with multi-pin motor connector

2010 model with 3 and 5 pin connector

2. The controller is located behind the triangular plate located underneath the battery cradle. It is also accessible from beneath the bike by removing the tunnel shaped cover (see section 10 and 11 for details of removing the cover).

3. Apart from adjustment of the maximum speed on early bike models no adjustment or testing of the controller off the bike apart from checking connections as described in the throttle section above and in section 11 is practical without more specialised equipment and they should be replaced with genuine Wisper parts if found faulty following correct diagnosis procedures in the fault finding sections 7 and 8.

4. Special care must be taken with older style controllers on 2008 models to make a note of the connector arrangements before disconnecting any leads as some plugs and sockets can be easily confused with others. The brake lever cut outs and de restrict switches utilise identical connector and wire colour codes so these components must be identified and the cables labelled before disconnecting them.

5. On no account connect together any unused plugs and sockets on the controllers as these are meant to be left disconnected and connecting them will damage the bike electrical system.

6. In most cases each controller is unique to the model and no attempt should be made to substitute controllers from one model to another. When ordering spare controllers always quote the ECN number as shown below along with the operating voltage and model number.

ECN 0133 type controller for 2010 models

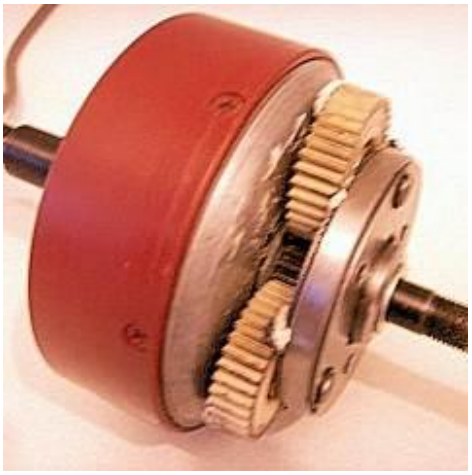
3 Motors:

1. Wisper bikes currently use two types of motor fitted in either the front or rear wheel referred to as the Bafang or Dapu motor type. The Dapu is used in the Alpino range and the Bafang in all other models.

2. Both are brushless motors with the Bafang motor incorporating Hall effect sensors and the Dapu motor being of a sensorless design. This results in different wiring arrangements as shown later in this section.

3. Both motors use internal gearing which is replaceable in the Bafang motor

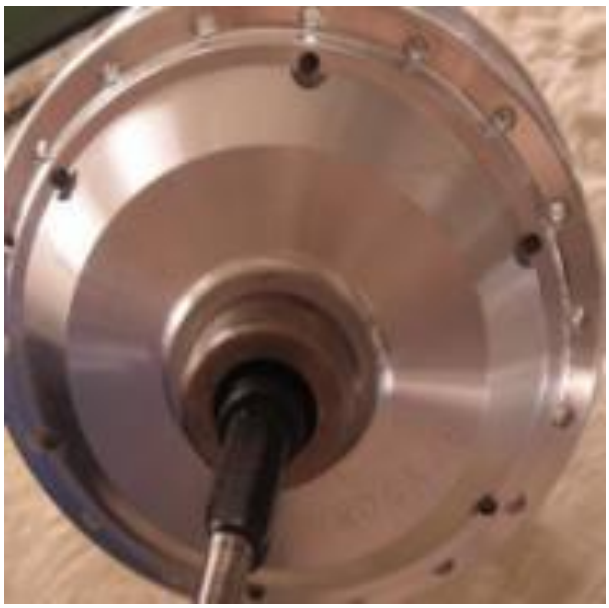
4. The Bafang motor showing the internal gearing



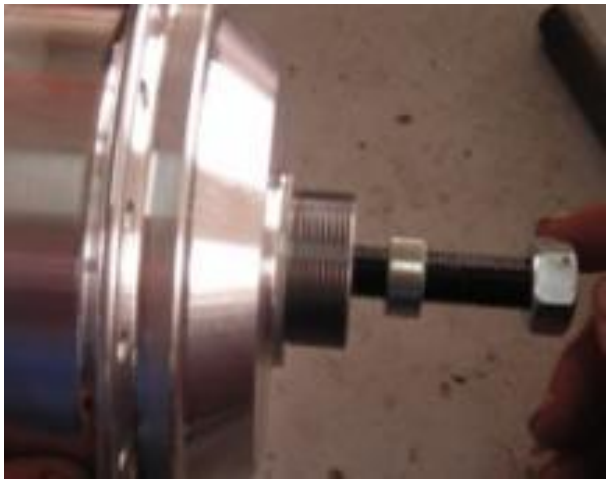
5. There is no routine servicing required on these motors but a periodic inspection and re-greasing of the gears should be undertaken if the bike is used for very high mileages, if any excessive gear noise is evident or water ingress is suspected.

6. To disassemble the motor first remove the motor connecting plug following instructions shown in section 15. Then using a standard freewheel extraction tool, remove the freewheel.

7. This provides access to the 6 side cover screws that should be removed.



8. Take off the left hand nut that keeps the entire inner assembly in the hub.



9. Give a sharp tap to the end of the spindle using a mallet or similar to release the cover from the hub shell and the entire inner with side cover can be withdrawn. You will then see the gear assembly and the rack inside the hub shell. These gears can be replaced either as a set of 3 or as a complete assembly if any damage is visible.

10. Make a note of any shims on the end of the spindle that might fall off inside the hub shell and make sure you put them back when reassembling.

11. Before reassembly re-lubricate the gears with a specialist grease (see range from Kluber). Reverse the above procedure when reassembling and tighten the external axle nut fully to ensure the correct internal positioning of the gears.

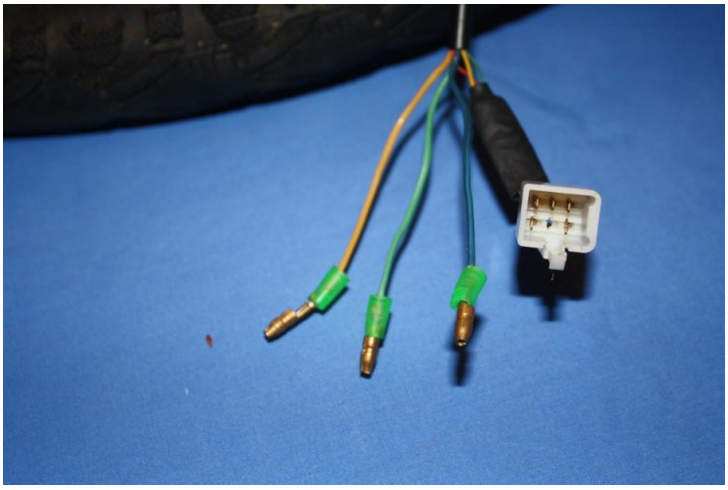
12. Due to the need to ensure correct axial alignment of the motor internal components it is not recommended that the motor hub is replaced separately to the outer housing built into the wheel but instead a complete motor assembly should be used.

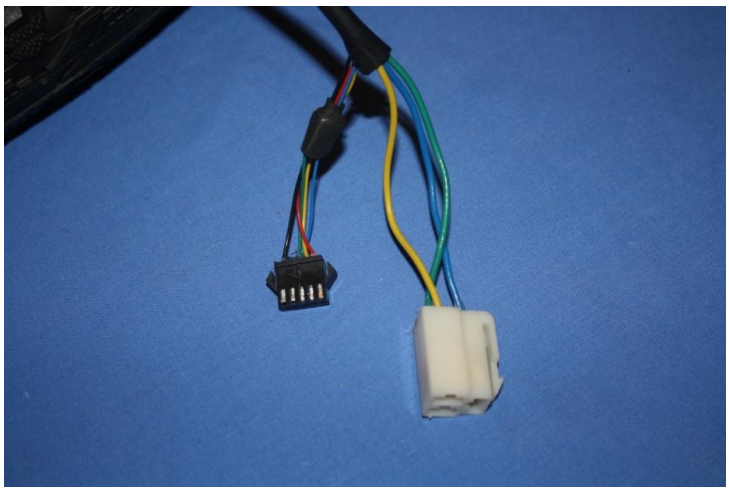
13. There are no service procedures recommended for the Dapush motor.

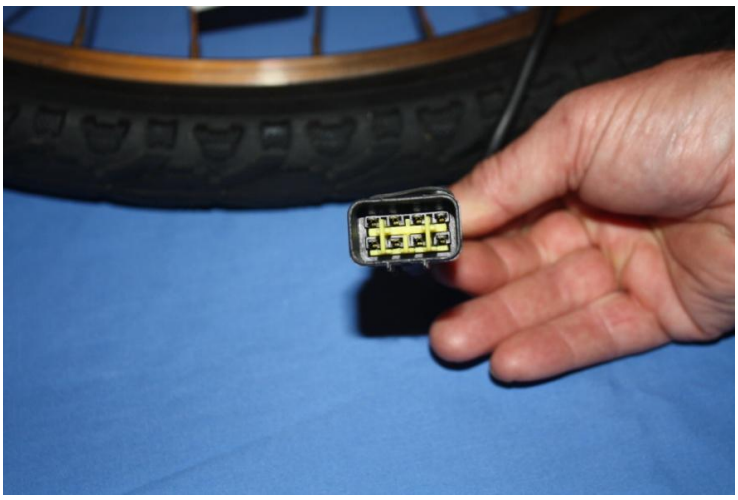
Wiring arrangements:

14. The Bafang motor has 8 cables connected to the motor, 3 heavy cables for the main power connections and 5 lighter cables for the connections to the Hall effect sensors.

15. The motors have a variety of connector types with some examples shown here;

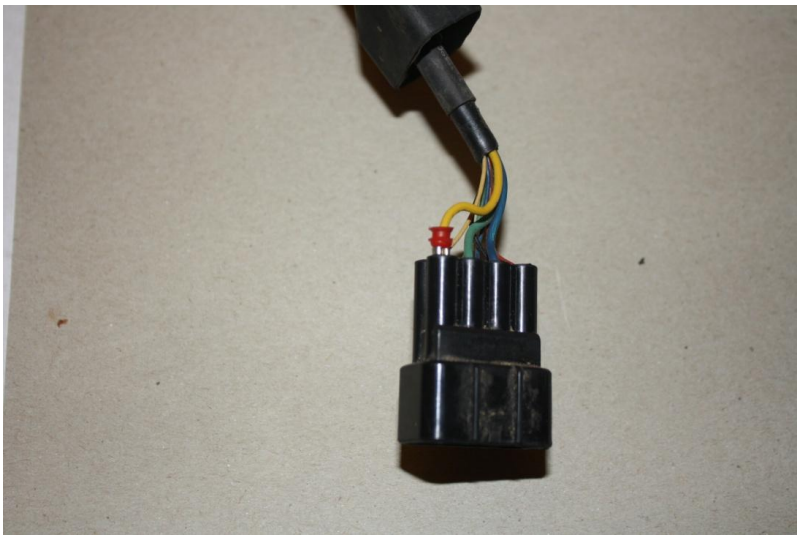






16. Always ensure the colour codes on the 8 motor cables match the corresponding colours on the controller connector and that the power connectors are not swapped with the Hall effect connectors. Regular maintenance for bikes fitted with an eight way multi-pin connector is recommended. Further details are included in section 11.

17. Ensure the pin inserts are fully engaged in the male and female parts of the 8-way connector and are properly latched in place. Check the rear of the connectors for inserts that are not properly installed as shown below. If pins are found to be in this condition refer to section 11 for repair procedures.

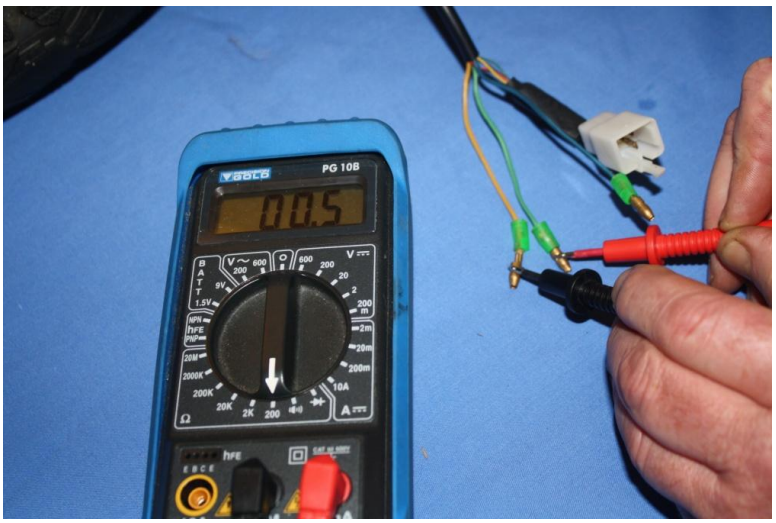


18. The Dapu motor incorporates a 6-way connector with 3 power connectors and 3 wires providing a speed sensor output. The 6-way connector is moulded to the cable and is not replaceable.

Visual inspection and electrical tests: The following inspection and tests can be undertaken on wheels fitted with the Bafang motor if a wheel is suspected as faulty.

19. Check the condition of the wiring where it emerges from the end of the hollow motor spindle for damage. Carefully remove any rubber end cap from the spindle and ease the protective spring back down the cable toward the connector plug. Examine the wiring for typical damage caused by the user as shown below

20. If damage is evident or the wheel exhibits intermittent type rotation under power or other intermittent fault check the electrical continuity of the motor windings via the 3 main power connectors as follows. Using a multimeter on the lowest Ohms range connect the meter probes between any two of the 3 connectors. A reading close to 0 should be obtained as shown below (0.5 ohms for this motor which is a satisfactory reading). Then repeat the process using 2 different connectors and finally a third time using a third combination of two out of three cables. A reading close to zero should be obtained for each of the 3 possible combinations. Finally test each winding for a possible short circuit to the metal body of the motor by testing the continuity between each connector and the motor body in turn. The reading should be infinity on the meter or indicate open circuit if using a continuity type tester. A reading close to zero would indicate a fault. See picture below showing the test procedure. If unsatisfactory readings are obtained or the cable is damaged then return the wheel to Wisper service for further investigation.



21. With the bike suitably supported of the ground and the power off rotate the wheel in a forward and backward direction by hand. In the forward direction there should be little or no resistance. In the backward direction there should be a small amount of additional resistance resulting from the motor internal gearing. If excessive resistance is felt in either direction then return the wheel to Wisper service for further investigation.

22. No testing is possible on the Dapu motor and it should be returned to Wisper service if found faulty after following the fault finding procedure.

4 Batteries

1. Wisper bikes use a variety of battery sizes and capacities the details of which are shown in Annexe 1. A selection of battery types is shown below:

Early 705 and 805 batteries

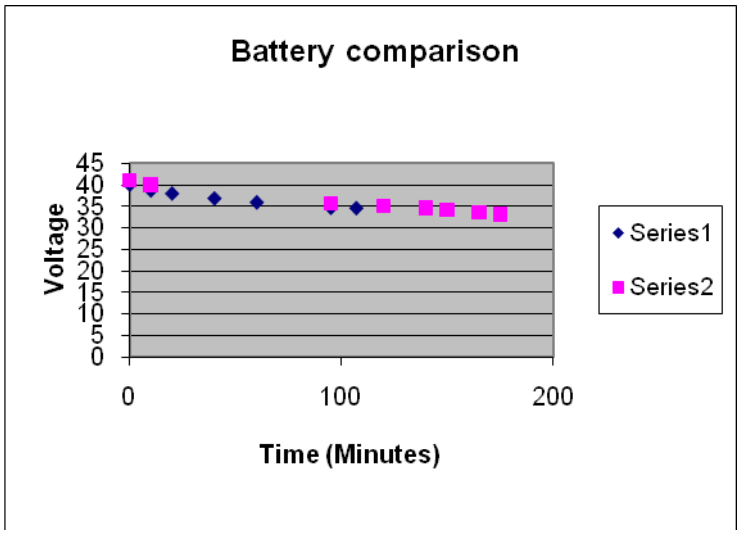
Kettle plug type battery from early model 905's

Current 705 and 905 model battery

2. All batteries use Lithium Ion technology and incorporate a battery management system and LED charge status indicators including a test button.

3. Batteries are rated at a nominal voltage of 24 or 36 volts depending on the model. This however is a nominal operating voltage and a fully charged battery will have a voltage in the region of 27.8 or 41.7 volts respectively.

4. During use the battery voltage will slowly decline from the fully charged voltage as shown in the graph below (36 volt 14Ah and 8Ah batteries shown):



5. For a 36 volt battery the voltage will decline towards 30 volts during discharge and at 31.5 volts the low voltage protection circuit designed to

protect the battery from excessive discharge will be activated and cut the power to the bike.

6. The battery capacity is specified in terms of Amp hours (Ah), which is calculated by multiplying the average current delivered during discharge by the time in hours to a fully discharged condition.

7. The batteries are not designed to be serviced but dealers following the procedure below can undertake fault diagnosis and limited testing and repair. The battery cases should not be opened as this will void the warranty and if a fault is suspected following the correct diagnosis procedures in the fault finding sections 7 and 8 they should be returned to the Wisper service department for further investigation.

8. For later bikes the 8Ah and 14Ah batteries can be interchanged following the procedure shown later in this section but a charger of the correct size must be provided if changing from a 14Ah to 8Ah battery.

9. Charging procedures: charging procedures are covered in the user manuals and particular note must be taken by dealers of the need to charge batteries on a regular basis if held in stock for extended periods to avoid deterioration in storage. A fully depleted battery left for longer than two weeks can incur irreparable cell damage which will not be covered under warranty. It is the Dealer's responsibility to maintain the battery as described in the user manual

4.1 Battery fuses

1. Most Wisper batteries contain two fuses. One of these is shown in the image below:

2. The fuse fitted at the top of the battery next to the key switch is the charging fuse and is rated at 5 amps.

3. The fuse fitted at the bottom of the battery on the opposite side to the key switch (not shown in the above picture is the main output fuse and is rated at 20 amps.

4. **On no account should any other size or type of fuse be used.**

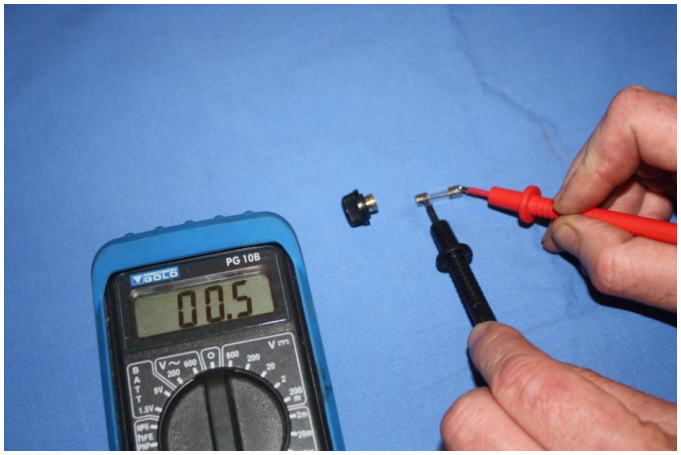
5. For older style batteries using a kettle plug connector on the side only one external fuse is fitted and depending on the battery age this can be either the charging fuse or the main output fuse. If in doubt please contact Wisper Service department before proceeding further.

6. For 806 and 805Fe batteries only one external fuse is fitted (a 15A output fuse) located as shown in the image below (L.H. top corner).

7. For older style Aluminium case batteries fitted to early 705 models the fuse fitted to the top of the battery is the charging fuse and the bottom fuse is the main output fuse.

8. Fuses should be checked as a matter of routine when servicing the bike or when diagnosing problems. To remove the fuse, use a Philips No.2 (not Pozidrive) screwdriver to unscrew the fuse holder cap and remove the fuse. Visually inspect the fuse for any signs of burning (black soot like deposits) or damage to the glass or end cap fittings. Replace or clean if necessary with a fuse of the correct rating.

9. Fuses can be tested using a multimeter set to the Ohms or continuity range as shown in the picture below



10. A reading of close to 0 Ohms should be obtained on the meter. If higher this indicates a poor contact or blown fuse which should be replaced using a genuine Wisper replacement fuse only of the correct capacity. Check the end caps are secure on the fuse before refitting and if in doubt replace the fuse.

11. **When refitting the fuse take great care not to over tighten the fuse holder cap as it will be damaged or broken if excess force is used. Only tighten using light finger pressure.**

12. **Do not spray any type of cleaning fluid or other fluid into the fuse holder when refitting the fuses.**

4.2 Battery change procedure

1. On later 700 and 900 series bikes the 8Ah and 14 Ah batteries can be interchanged following the procedure shown below but a charger of the correct size must be provided if changing from a 14Ah to 8Ah battery.

2. To change the battery, remove the battery from the bike following the procedures shown in the user manual. Then remove the battery support rail complete with plastic lock pin retaining plate from the lower cradle by unscrewing the single countersunk screw located at the bottom of the support rail and the intermediate locating screw using a Philips No. 2 screwdriver.

3. Remove the plastic lock pin retaining plate from the top of the rail by unscrewing the single countersunk screw located at the top of the support rail using a Philips No.2 screwdriver and fit to a replacement rail with the correct length for the new battery. Replacement rails are available from Wisper service.

4. Refit the rail assembly by reversing the above steps and check the new battery fits securely into the lower cradle and engages correctly with the battery connection power pins. Check the lock pin engages in the hole in the retaining plate without undue force being applied to the key and that power is being provided to the bike.

5. On earlier bikes fitted with kettle plug type batteries the battery case are identical irrespective of capacity but the polarity of the output connection can vary between batteries. Therefore the polarity of the new battery must be checked for compatibility with the existing battery and bike wiring before changing the battery. Failure to observe this will result in severe damage to the bike electrical system.

6. Warning – Never connect a mains lead directly to the kettle plug socket on the battery.

4.3 Battery fault finding procedure

Obtain a description of the problem from the customer and depending on this information and any observations made when checking the bike choose from one of the 3 main headings below:

4.3.1 No power to bike

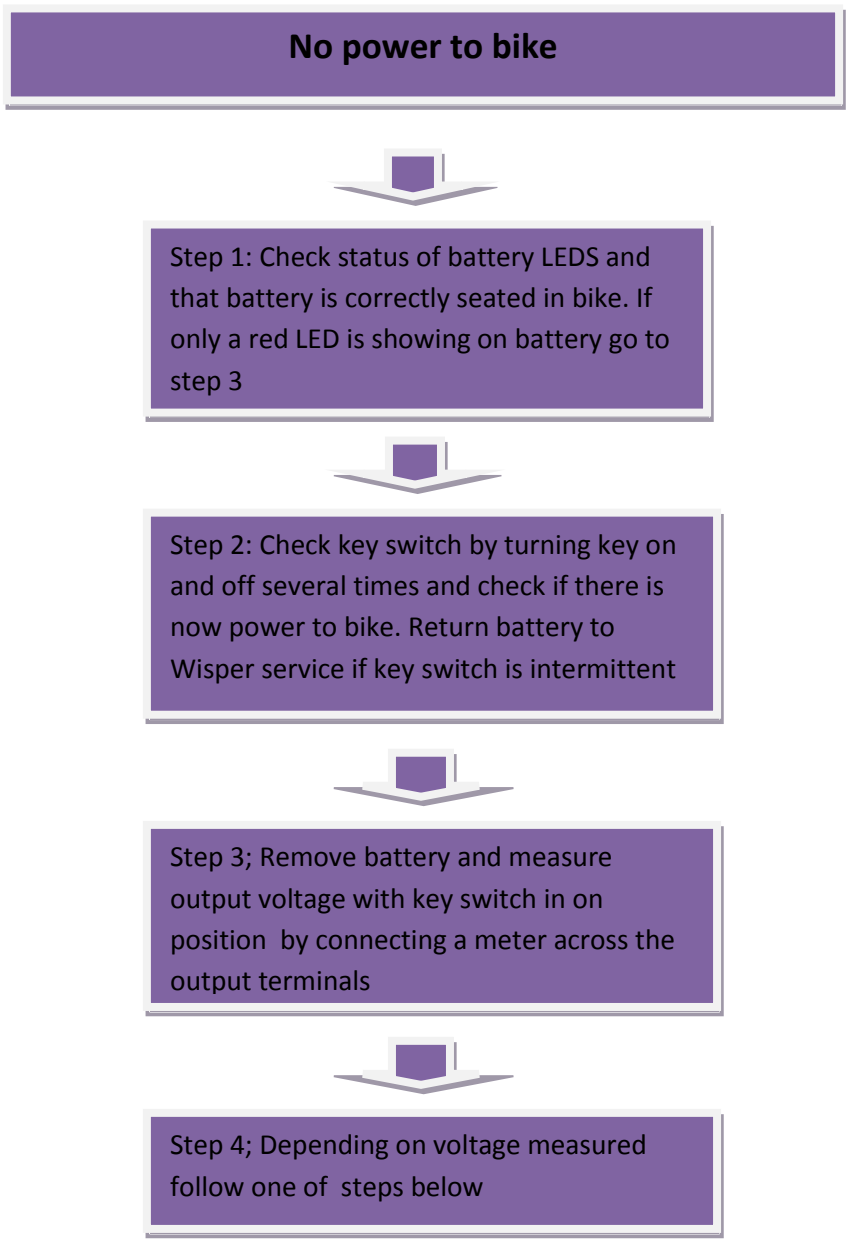
If there is no power to the bike then go to the purple flow chart below and follow the steps.

4.3.2 Battery will not charge

If the battery will not charge then go to the blue flow chart below and follow the steps

4.3.3 Low range or cutting out

If the battery is giving a low range or cutting out then go to the orange flow chart below and follow the steps.



Step 6; Measure voltage again. If still 0 volts or < 30 volts then return battery to Wisper

Step 7: If between 30-40 volts try battery again on bike. If problem resolved recharge battery until green light shows on charger and test battery voltage (should be approx 41.7). If problem is not resolved or reading is not approx 41.7 then continue with main bike fault finding procedure in section 7 or 8 of manual or return battery to Wisper.

Step 8; If > 40 volts try battery again on bike. If problem resolved there is no need to recharge the battery. If problem is not resolved then continue with bike fault finding procedure in section 7 or 8.

Battery will not charge

Step 1: Measure output voltage or check status of battery LEDS. If voltage is approx 41.7 volts or all 4 green LEDS are visible than battery is fully charged and charger LED will go straight to green when the charger is connected. If not fully charged then connect battery to a charger of known performance if available and observe behaviour of charger LEDs and fan for correct charging cycle behaviour

Step 2: If battery charges correctly then test customers battery charger as described in the main manual and replace charger if faulty

Step 3: If a charger of known performance is not available then test customer's charger as described in the main manual to ensure it is not the cause of the problem and then try charging the battery

Step 4: If the battery will still not charge then remove the fuse from the fuse holder at the top of the battery and test as described in section 5 of the manual. If faulty replace with correct 5 or 10 amp fuse and try charging again.

Step 5; If problem persists then return the battery and charger to Wisper service for further investigation.

Low range or cutting out

Step 1: Obtain description of problem and history from customer.

Step 2: Check external factors affecting range from the annexe of this manual and discuss with the customer if these are likely to be the cause of the low range.

Step 3: Discuss with the customer how often the battery has been charged and what is the maximum time it has been left between recharges. If left for more than 2 months then the battery is likely to have incurred damage that will not be covered by the warranty.

Step 4; Measure output voltage of the battery as received for reference purpose. If less than 30 volts then return battery to Wisper for further investigation

Step 5; Check bike overall condition (if available) for items described in the annexe and correct / adjust as necessary if any faults found.

Step 6; Check customers battery charger is delivering the correct voltage as described in the main section of the manual. If not then repair or replace and work on assumption that the charger is the likely cause of the problem

Step 7: Charge the battery using either the customer's charger if considered serviceable or a charger of known performance. When fully charged measure the voltage and check it is approx 41.7 volts.

Step 8; If greater than 41 volts then road test the bike / battery and discuss performance and other findings with customer

Step 9; If less than 41.0 volts when fully charged then consider trying a second charger.

Step 10; If still less than 4`1.0 volts or any doubts remain as to the range of the battery then return the battery to Wisper service for a full capacity check as this is the only way to accurately quantify the capacity. If found to be less than 75% of the rated capacity and it is less than two years old and has been charged on a regular basis as described in the user manual it will be replaced under warranty

5 Battery Chargers

1. Most Wisper bikes utilise a fan-cooled charger rated at 24 or 36 volts and 2, 3 or 4 amp output.

2. General instructions for use of the chargers are included in the user manuals.

3. Only use the correct charger supplied with the bike and do not substitute other types or sizes of charger.

4. Do not attempt to use a 36 volt charger on a 24 volt battery or vice versa.

5. Only use the 4 amp charger (identifiable by a gold label) on 14Ah batteries. Use of the 4 amp charger on 8 Ah batteries may lead to serious overheating of the battery resulting in possible damage. If changing from a 14Ah battery to an 8Ah battery a replacement charger of the correct size must be provided to the customer on an exchange basis.

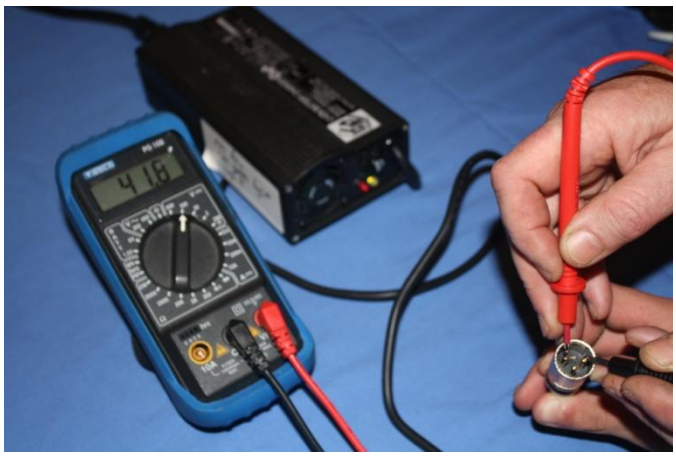
6. Charger faults: If the amber charging light and fan does not remain on when the battery is put on charge but instead the light goes straight to green and the fan stops the following items should be checked:

7. Check the battery indicator LEDS to ascertain the charge level of the battery and also the output voltage using the procedure listed in the battery fault-finding procedure above. If the battery is fully charged then the charger LED will exhibit the above characteristics and no further action is required or the charger should be tested on a depleted battery.

8. If the charger still exhibits this characteristic then With the charger unplugged from the battery switch on the charger at the mains and at the switch on the back of the charger. Check that the single red mains indicator light is illuminated. If not check the fuse in the power supply lead.

9. If the red light is lit carefully measure the charger output voltage by using a multimeter on a 200 volt DC range as shown below to measure the charger output. A reading of approximately 41.7 volts should be

obtained for a 36 volt charger. Great care is needed when doing this not to short out the charger when connecting the test lead probes.



10. If there is no output check the fuse located in the charger that can be accessed by removing the fuse holder cap locate don the front of the charger. Check the fuse following the procedures above and replace if necessary using the correct rated Wisper fuse. Older chargers utilise a 5 amp fuse whereas later chargers use a 10 amp. Always replace with a similar size rated fuse.

11. If the charger still does not work return to Wisper service for further checks.

12. Similar charger behaviour can also be displayed if there is a bad connection where the charger plugs into the battery. Carefully check for corrosion or looseness at the battery-charging socket particularly on older style kettle plug batteries. If found please return the battery to Wisper service for repair.

6 Logical Fault finding procedures on bikes fitted with Bafang motor system (flow chart based)

The flow charts below cover a generic logical fault finding process for Wisper bikes fitted with the Bafang motor system. Due to the number of models covered by this manual its is not possible to cover all of the possible combinations of faults for each model variant but the procedures below should provide a general guide as to how to approach fault finding.

It can also be used as a generic fault finding aid for Alpino bikes but further information regarding the use of the built in diagnostic capability on Alpino bikes is covered in the next section and should be used in conjunction with this section of the manual.

When attempting to diagnose faults on the bike first discuss the problem with the customer to gain an understanding of the background and history. Key questions to ask the customer are:

- Do the power indicator status lights (red light on throttle or on LED handlebar display) remain lit when the problem occurs?
- is the fault intermittent or does it occur after a certain distance?
- does the problem occur in throttle or pedelec mode or both modes?

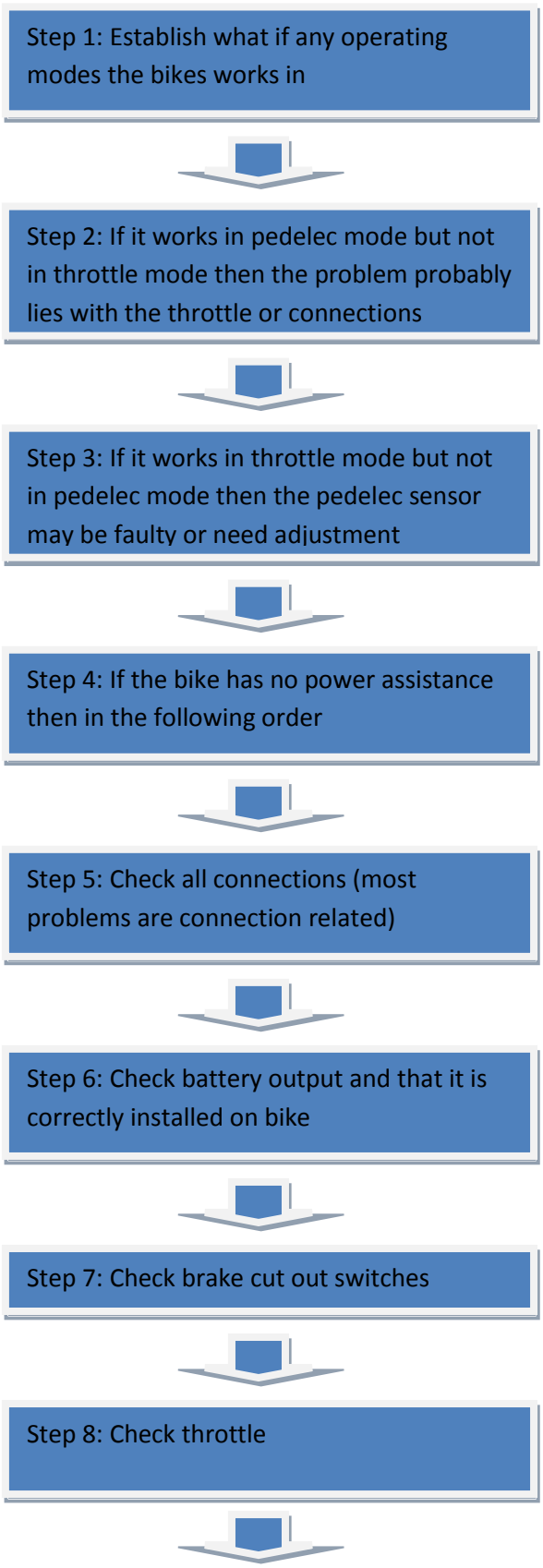
Always consider that it is possible that the bike has more than one fault and this must be born in mind when fault finding.

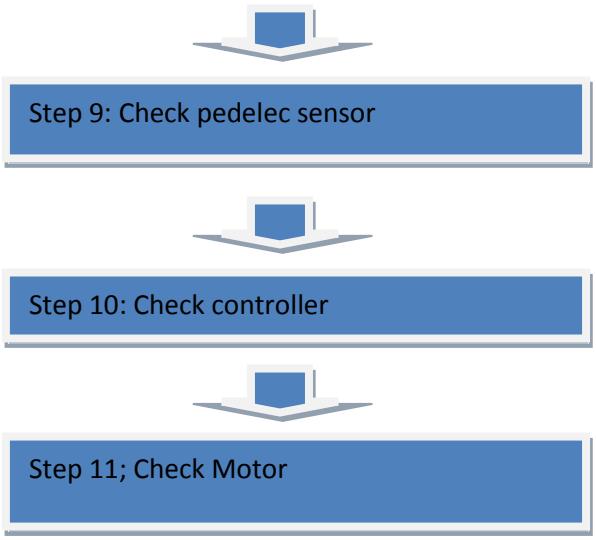
Also a fault in the pedelec system on 2008 and 2009 models could also impact on the use of the throttle depending on the mode in which the bike is set up (throttle dependent or independent of the pedelec). An apparently faulty throttle could in fact be the result of a fault in the pedelec system if the bike is in “pedelec dependant” mode (two purple wires at the controller connected together) as the throttle will not work in this mode if the pedelec sensor is faulty.

For 2010 bikes the throttle should provide power independently of the pedelec up to 4mph or maximum speed when the two purple wires are connected.

6.1 Top level fault finding:

The general order of fault finding should be as shown in the flow chart below:




Step 9: Check pedelec sensor
Step 10: Check controller
Step 11; Check Motor

6.2 Detailed fault finding procedure:

Ensure the bike is secured in a suitable stand. An ideal arrangement to do this and for most service activities is to clamp a spare seat post in the seat post tube (using a spare seat post clamp) and to then invert the bike and place the seat post in a vertical support tube securely fixed to the workshop floor as shown in the image in section 10. This allows easy access to the bike controller and motor connectors. (Ensure the battery is locked to bike before attempting to do this and safe manual handling procedures are followed along with an appropriate risk assessment).

If there is no power assistance at all to the bike the following procedure should be followed;

Step 1; Check all connections at the fcb, the controller and the motor cable connector. Check that all connectors are fully inserted into their opposite half and latched, that no wires have become detached from the connector pin inserts, and that no pin inserts are protruding from the back of the connectors. See images in section 3 for typical problems. Rectify any faults found and try the bike again. If the problem is cured refit all cover plates ensuring no wires are trapped and road test the bike.

Step 2: Check condition of all cables for cuts, chafes and other external damage. Particular attention needs to be given to the motor cable where it emerges from the motor axle for any damage caused. Replace any components with damaged cables. Try the bike again. If the problem is cured refit all cover plates ensuring no wires are trapped and road test the bike.

Step 3: If not resolved then remove battery from the bike and check the battery has power at the output terminals by testing with a millimetre as described in section 5. Voltage must be above 36 volts in order to continue fault finding. If not then follow process in section 5

Step 8: If the throttle is now working then suspect one or more of the brake lever cut out switches is faulty. If possible check the switches as described in section 3 to identify the faulty component. If not Refit one switches connector to the wiring loom in its original position and tests the bike again. If not working then the first switch is faulty and should be replaced. If still working then fit the second switch and test again. If the bike now no longer works the second switch is faulty and should be replaced. Reconnect all wires and re fit all cover plates ensuring no wires are trapped and road test the bike.

Step 9: If no apparent faults are found with the brake switches and the bike is still not working then disconnect the two switches again. Then rotate the pedal cranks through one complete turn (simulating peddle mode). Does the motor operate? If the motor is now working it suggests a throttle fault and a replacement throttle should be fitted if no faults can be found with the connections to the throttle.

Step 10: If no response in peddles mode then check alignment of peddle sensor as described in section 3. Adjust alignment and gap if necessary. Check cable is not damaged to the sensor and check the wiring connections again for the sensor where it connects to the controller (see section 3 for details)

Step 11: Recheck operation in peeled mode. If the bike is now working reconnect all wires and re fit all cover plates ensuring no wires are trapped and road test the bike.

Step 12: If not working replace the pedelec sensor. If the bike is now working reconnect all wires and re fit all cover plates ensuring no wires are trapped and road test the bike

Step 13: If the bike is still not working then recheck the controller connections. Contact Wisper service and obtain a replacement controller quoting ECN number from old unit

Step 14: If the bike is still not working then re check motor connections and cable and check the motor as described in section 4. If a fault is suspected then discuss problem with Wisper service and obtain a replacement wheel

Step 15: On completion of repair reconnect all wires including the brake cut out switches and purple wires if appropriate and re fit all cover plates ensuring no wires are trapped and road test the bike.

If no status lights are visible on the handlebar controls then follow the procedure below:

Step 16: Check the battery output voltage at the bottom or side mounted terminals by testing with a millimetre as described in section 5. Voltage must be above 36 volts in order to continue fault finding. If not then follow process in section 5 of the manual

Step 17: Check the battery key switch can turn fully to the on position and the locking pin is not being restricted in any way from fully engaging in the key switch locking plate fitted to the bike.

Step 18: With the key switch in the fully on position check the voltage at the white two-pin connector that connects the battery supply to the controller. The voltage should be the same as measured directly on the battery above. If not then recheck the battery mounting arrangements and the cables from the fixed battering connecting terminals on the bike or the flying lead in the case of kettle plug type batteries.

Step 19: If fitted with an old style throttle that has a red push button on off switch then disconnect the throttle at the fcb or controller and test the red on off switch as described in section 3. If faulty fit a replacement throttle

Step 20: If fitted with a LED handlebar mounted display incorporating the on off switch then fit a replacement unit as no testing is possible on these units.

Step 21: If still no power to the bike then recheck the controller connections. Contact Wisper service and obtain a replacement controller quoting ECN number from old unit.

Step 22: If the bike is now working then reconnect all wires including the brake cut out switches and purple wires if appropriate and re fit all cover plates ensuring no wires are trapped and road test the bike. If the status indicators are now working but the bike is not working then continue the fault finding using the flow chart above from step 6

7 Fault finding procedures on Alpino model bikes fitted with Dapush motor system and LCD diagnostics display

A table containing simple fault finding procedures is included in the user manual and this should be consulted in the first instance if problems are suspected.

In addition the Alpino range of bikes incorporate a built in diagnostic fault finding system and details on how to interpret the fault codes on the LCD display are shown in the table below;

LCD fault code	Likely cause
02	Often caused by inappropriate use of throttle and riding technique. If problem persists return wheel to Wisper service to check for short circuits in motor connections or motor internal windings.
03	Motor cable connection may be loose. Check that motor is correctly plugged into the wiring harness at the wheel and connections at the controller are not loose or corroded.
04	Battery voltage is too low. Check battery output as described in section 5
05	Brake lever cut out function problem. Check connections in FCB initially. Then disconnect both brake levers and then reconnect each brake lever in turn until fault repeats itself. Then replace faulty lever with new part.
07	The throttle is faulty. Check connections in FCB and then replace throttle with new part if problem persists
08	Controller faulty. Check connections at controller housing for tightness and corrosion. If problem persists replace controller
09	Battery output voltage is too high. Measure voltage and refer to Wisper service for advice.

In most cases the information above should provide a solution to most problems but if problems still persist then follow the generic fault finding procedure listed above in section 7.

8 LED Front lights

1. Some models are fitted with LED headlamps wired to the bike electrical system.

2. On Alpino models the lights are automatic and incorporate a light sensor to switch the light on and off depending on ambient light conditions. Further details on operation are included in the user manual.

3. On non-Alpino models the light is controlled via a switch on the LED handlebar display unit (see section 4).

4. The lights are not interchangeable and care should be taken when ordering replacements to obtain the correct type. The Alpino type is easily identified by the presence of a small hole on the underside of the lamp body where the sensor is located.

5. For these lights care should be taken to ensure the correct polarity is observed when connecting the wires. The black cable with the white tracer should go to the terminal marked + on the light which is on the left hand side when sitting on the bike facing forward.

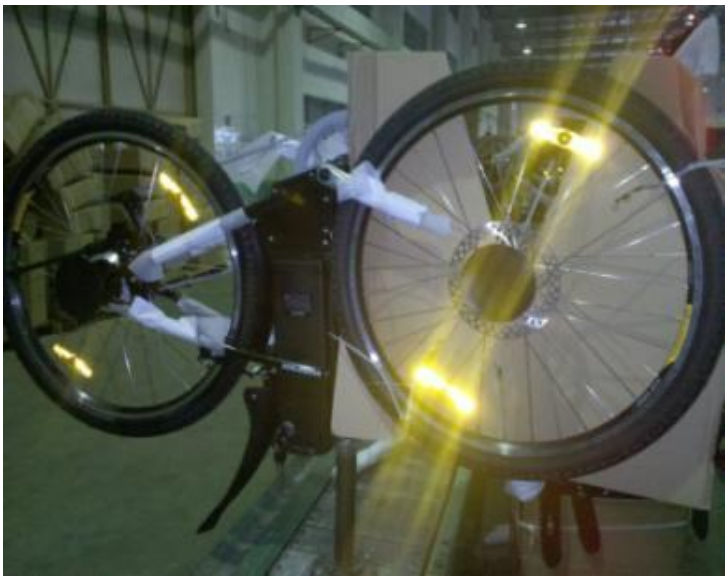
+ (Positive) terminal is in bottom R H corner in the above view

6. If the Alpino light has been connected with the wrong polarity it is likely that the auxiliary light controller located next to the main controller may have been damaged. Spares of these are available from Wisper support.

9 Removing and replacing motor wheels from the bike for servicing

9.1 Non Alpino models;

1. To remove the rear wheel turn the bike over and ensure the bike is secure in a suitable stand or resting on raised blocks on the handlebars to ensure no damage occurs to the handlebar controls. An ideal arrangement to do this and for most service activities is to clamp a spare seat post in the seat post tube (using a spare seat post clamp) and to then invert the bike and place the seat post in a vertical support tube securely fixed to the workshop floor as shown in the image below. This allows easy access to the bike controller and motor connectors. (Ensure the battery is locked to bike before attempting to do this and safe manual handling procedures are followed along with an appropriate risk assessment).



2. From the underside remove the tunnel shaped cover by unscrewing the 4 Allen screws holding the bottom cover in place (it is the tunnel shaped plate, just behind the pedal crank axle – on the bottom of the bike, directly under the battery/controller housing).

3. You now have access to the high current connections of your bike.

4. Unplug the eight-pin motor cable plug or the 3 separate motor connectors and one 5-pin connector.

5. Note: depress the end of the release lever to unlock the multi-pin plug so you can disconnect it.

6. Unclip the motor cable from the chain stays of the frame by carefully cutting the tie.

7. Remove the derailleur protector frame by undoing the two screws holding it to the frame drop out. Do not attempt to remove the derailleur itself from the drop out.

8. Remove the plastic covers from the axle ends. Slide the cover fitted to the RHS of the axle down the motor cable to give access to the axle

9. Slacken the axle nuts using a 18mm spanner. Then using finger pressure only unscrew the RHS nut as far as possible along the axle taking care not to damage the motor cable where it emerges from the axle end. This will provide enough clearance to lift

the wheel complete with motor cable clear of the drop-outs and derailleur gear changer. Ensure the motor cable is not snagged and lift the wheel clear of the bike.

10. To reinstall reverse the above procedure tightening the nuts to the torque setting shown in Annexe 3.

11. Re clip the motor cable in position with new cable ties ensuring it cannot rub against the rear tyre and reconnect the motor connector(s) correctly. Check the adjustment of the rear brake pads and test the rear brake before test riding the bike.

9.2 Alpino models

1. Turn the bike upside down and secure it in a safe working position as per the first step in the above procedure.

2. Unplug the multi-pin motor cable connector located on the LHS front fork stanchion and carefully cut any tie wraps securing the cable.

3. Remove the plastic covers from the axle ends and slacken the nuts using a 19mm spanner.

4. Remove the front wheel taking are not to displace the front disc pads from the brake calliper.

5. Reverse the above steps to reassemble and tighten the axle nuts to the torque shown in annexe 4. Ensure the brake pads are correctly located in the brake calliper and renew any cable ties removed ensuring the cable cannot rub against the front tyre and reconnect the motor connector(s) correctly.

6. Test the front brake before test riding the bike.

10 Servicing of electrical connections

10.1 Maintenance of motor Connections:

1. Check the high current plug/socket connections for your motor and power-input every 6 months and remove any corrosion.

2. To do this, turn the bike upside-down and remove the 4 bolts holding the bottom plate in place (it is the curved plate, just behind the pedal crank axle – on the bottom of the bike, directly under the battery/controller housing).

3. You now have access to the high current connections of your bike.

4. Unplug both the eight pin motor cable plug and the two pin battery input plug.

5. Note: depress the end of the release lever to unlock the plug so you can disconnect it.

6. Spray a little of contact improver (WD-40, CRC 2-26, etc) into both sockets. Check the 8 pins of the motor cable plug are well aligned and the yellow inserts are in place in both sides of the connector (unlike this example which has one missing). Straighten any that are off line or depressed into the socket too far (very carefully pull these up with long-nosed pliers).

7. Now reconnect the plugs until they click. Connect/Disconnect the plugs several times to help scrape off any oxide on the terminals (you don't need to fully separate the plug from the socket, just side it half off and then back on again several times).

8. Give the 8pin motor cable plug one final check to make sure all the pins are in line, then reconnect and lay both cables into their original positions and replace the Bottom plate.

9. Important: repeat this process every 6 months to avoid socket burnout.

10. Later model bikes use 3 separate bullet type connectors for the high power motor connections and these should be checked and cleaned by Connecting/Disconnecting the plugs several times to help scrape off any oxide on the terminals followed by Spraying a little of contact improver (WD-40, CRC 2-26, etc) into the 3 separate sockets.

10.2 Removing 8 pin connectors

1. To remove the connector first remove the yellow insert by carefully pulling it out of the connector using long nosed pliers.

2. The pins in both sides of the plug connector can then be removed by carefully easing back the locking catches within the base of the plug housing and pushing the pins out towards and through the back of the connector. A small flat bladed jeweller's screwdriver normally works OK.

3. However the catches on the black 8 way connector type do not always spring back into the locked position (its not really designed to be reused) so great care is needed when reassembling as if these catches are not properly engaged with the pins the pins can slip back into the housing which could potentially lead to poor contact and possible overheating.

4. You also need to check the yellow pin locking inserts are in place in both halves of the connector on reassembly, as without these in place the above catches will not be properly secured.

5. There should be one of these yellow inserts in each part of the connector (the two inserts are different for the male and female half of the connector) and they should snap firmly into place.

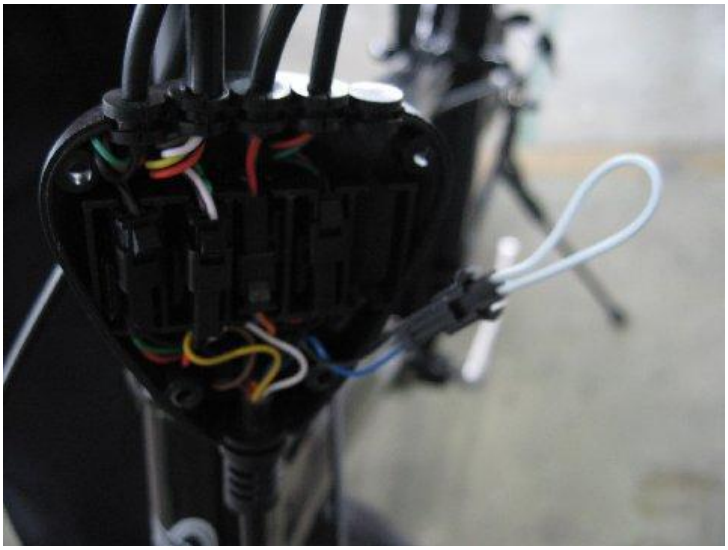
6. Spares of these yellow inserts are available.

7. Also please check the orange sealing gasket is in place and properly located in the controller half of the connector as this can be dislodged preventing the plug from fully engaging. Also likewise the red wire entry seals.

11 The green de restrict button

1. To install the green button remove the left hand handlebar grip and slide the green button onto the handlebars with the button lowermost. Reinstall the grip and then tighten the Allen screw in the button housing to clamp the button adjacent to the end of the grip.

2. Remove the 4 small screws from the back of the fcb and detach the front cover of the fcb. There is a two pin connector inside the fcb which will either have a connector already fitted with a short white wire loop going across the connector pins or possibly the connector will have nothing plugged in. If necessary remove the connector with the wire loop and plug the green button connector in its place. (see image below and the wiring diagram shown later in the manual for more details of the wring).



3. Fit the grommet supplied over the end of the green button cable's outer insulation nearest the fcb. The grommet is split to make fitting easy. Remove the spare blanking grommet from the unused hole in the top of the fcb and fit the new wire and grommet in its place. Carefully align all the connectors and wires in their respective slots within the fcb ensuring none of the wires will be trapped when refitting the front cover. Refit the front cover and tighten all 4 screws securing it to the back part of the fcb. Do not over tighten the screws.

4. It is not recommended that Wisper dealers fit de restrictor switches to customer bikes. Switches can be provided to customers if requested for their own fitment.

12 Braking system components

1. Wisper bikes have used a variety of brake system components and care must be taken when replacing these components during maintenance to ensure the correct parts are used

2. Wisper currently uses Tektro brakes on the 705, 805, and 905 models.

3. Prior to that Promax brakes were used with either Apse or Tektro levers on 2008-09 models

4. Zoom brakes were used with Wuxing levers on early 2007 08 model bikes.

5. For the 706 Alpino, 906 Alpino and XC model bikes Shimano (Alfine) brakes are used with Tektro levers.

6. When ordering spare parts from Wisper please ensure the model type, year and frame number and details of the brake manufacturer are provided

7. For bikes fitted with the Promax brakes ensure the front disc pads are fitted correctly as the two pads are of a different thickness and need to be fitted with the thicker pad in the correct position. The thicker pad (originally with backing plate coloured blue) should be fitted on the opposite side to the calliper-operating lever (the side that has the large aluminium removable threaded plug).

Zoom disc brake pads fitted to early bikes

13 Pre delivery inspection (PDI) and 300 mile service procedures

The PDI is a critical part of the overall QA process and must be completed by the supplying dealer followed by a test ride and sign off before passing the bike to the customer.

The following items below are a generic list for all current Wisper models and must be covered during the PDI.

NB: The assembly of the bike is covered in a separate manual.

Item	Activity	Notes
	Cycle parts	
1	Check front and rear wheel for alignment and run out	Tighten spokes if necessary
2	Check tightness of front and rear axle nuts	Tighten to torque setting in user manual
3	Check front and rear axle plastic covers in place	
4	Check tyre pressures front and rear	Inflate to correct pressure
5	Check and adjust action of front and rear brakes	Ensure there is no noise or squeal
6	Check smooth action and adjustment of front suspension forks	Inflate air forks if necessary to correct pressure (see manual supplied with bike)
7	Check adjustment of bearings in headstock	Adjust if necessary
8	Check security of all handlebar stem fixings and clamps	Adjust to suit customer preferences
9	Check front and rear mudguards and skirt guards if fitted for security and clearance from tyres	
10	Check all cables are clipped securely and safely	Check motor cable cannot rub against the tyre
12	Check pedals have been fitted correctly and tightened fully	Note left and right hand threads
13	Check pedal cranks have been tightened fully on taper of axles.	Tighten to torque setting in user and service manual

14	Check smoothness and running clearance of bottom bracket	
15	Check seat post clamp quick release clamp is properly in place and secure and saddle is correctly fitted and secure	Adjust as necessary
16	Check smooth operation of gear change on either derailleur or Alfine hub gear and ensure all gears can be selected	Adjust as necessary
17	Ensure side stand supports bike correctly and does not interfere with other moving cycle parts	
18	Ensure rear motor wheel turns smoothly and quietly when rotated by hand in forward and reverse direction	Some additional resistance will be felt when rotated in reverse
19	Ensure correct chain tension on Alfine equipped models	
20	Ensure chain guard is not rubbing on models equipped with guard	
21	Ensure all reflectors are in place on pedals, wheels etc	

Electrical Parts

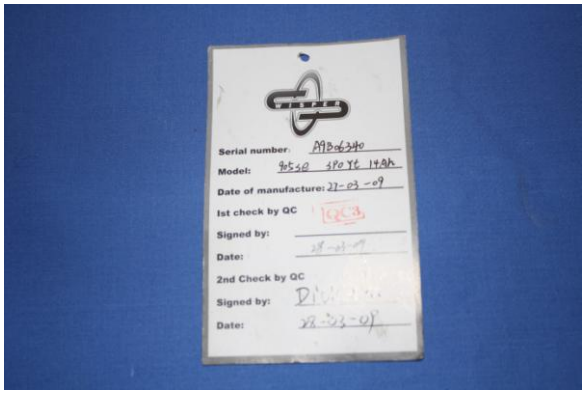
1	Fit and check correct operation of front and rear lights	Note Alpino lights are light sensitive
2	Check wiring at front connector box	All grommets to be in place and no bare wires to be visible
3	Check throttle returns smoothly to closed position and plastic spacer is in position	Adjust if necessary (see section in manual)
4	Check brake cut out switches cut power to motor	
5	Fit de restrict button if requested by customer and check functionality	
6	Check functionality of LCD display on Alpino bikes	Includes selection of power assist levels, speed readout, etc. and all functions are correct as described in the user and service manual

7	Check functionality of LED display on Non Alpino bikes	Ensure 3 levels of assistance can be selected and all functions are correct as described in the user and service manual
8	Check battery locates properly in the lower cradle and locks in place securely	Ensure 3 keys are present with same number
9	Check alignment and clearance of pedelec sensor	Adjust if necessary (see manual)
10	Remove triangular cover beneath battery cradle and check security of all plugs and sockets.	Check motor cable cannot rub against the tyre
11	Charge battery off the bike for 12 hours and check charger and battery functions correctly	Check status lights on charger and battery LEDs during and after charging. Advise customer to complete two more 12-hour charges.

Road Testing

1	Road test the bike in a safe environment to test functionality of both electrical and cycle systems as described in the user manual, and check noise and performance levels	Adjust / correct after test ride.
2	Notify Wisper service if any manufacturing faults are identified quoting details on the QA label and providing photographs if possible of any faulty components.	Print out and Sign off the above check list and pass to customer along with the QA label attached to the bike

The 300-mile service and any subsequent service should generally follow the above check list with particular emphasis place on re tensioning of spokes at the 300 mile service to ensure compliance with the Wisper warranty.



14 Identifying and ordering spare parts

If spare parts are required use the charts located in Annexe 1 to identify the model year, variant and type of components fitted.

This will assist Wisper service when ordering spare parts to ensure the correct part is provided.

It is also essential to provide the frame number which will be found on the headstock or on older bikes, underneath the bottom bracket and also the date of sale if available.

Spares can be ordered through:

Wisper Support
CycleMech
The Chantry (rear of)
The Mayford Centre
Mayford Green
Woking
Surrey
GU22 0PP

Email Address: support@wisperbikes.com
Phone number: 07799 794520

15 Frequently asked questions (FAQs)

The following section covers frequently asked questions. In many cases the detailed answers to these questions can be found in the relevant section of the manual but for convenience are included below.

Q. Can you swap a 14Ah battery to an 8Ah or vice versa?

A. Yes – on the 700 and 900 series from 2009 onwards they can be switched by following the instructions in section 5.2 of the manual

Q. What is a kettle plug battery?

A. A type of battery fitted to early model Wisper bikes that had a lead that plugged into the side of the battery using an electric kettle type plug and socket. See the description in section 5.

Q. Can I fit a new style battery to a bike fitted with a kettle plug battery?

A. No – the case dimensions and electrical contacts are different

Q. Why is polarity important on the kettle plug battery?

A. The output connectors on some early batteries were wired with the opposite polarity. Hence kettle plug batteries should never be swapped between bikes and when ordering or fitting a new battery the polarity of the output connector must be checked

Q. The red and black leads seemed to be reversed on my kettle plug battery lead where they go into the controller

A. This is quite normal and the cables should **not** be swapped over in an attempt to align the cable colours

Q. What do I do if I have no power to the bike?

A. See the faultfinding and battery sections of the manual and follow the procedures as described

Q. How long will a battery last

A. This depends on many factors the most important being regular usage and recharging at the prescribed intervals if left in storage. Further details are included in the service and user manuals. If properly maintained a life of up to 1000 charge and discharge cycles could be obtained.

Q. How can I extend battery life?

A. By following the instructions above.

Q. My customer is reporting a low battery range

A. See section 5.3 and Annexe 4 in the service manual for more details.

Q. How do I fit a de restrict switch?

A. See section 12 of the service manual

Q. Will the de restrictor switch make the bike more powerful?

A. No – this is explained in section 3.3 and 12.

Q. Can I fit a throttle to an 806 or 805fe?

A. Unfortunately not. The wiring and control system does not support the use of a throttle

Q. What brake pads do I need to stock?

A. Details of the brake pads are included in section 13 of the manual

Q. Can I fit a flip up saddle?

A. Yes – it is a standard accessory available from Wisper.

Q. Can I disconnect the brake cut out switches permanently?

A. This is not recommended as it will make the bike illegal to use in the UK and possibly in other countries and could cause damage to the motor

Q. Should the purple wires with the two plugs in the controller be connected or left unplugged

A. Generally these should be left in the same state as when the bike is delivered to you by Wisper. Further details are included in section 3.1 of the manual and in the fault finding sections

Q. There are unused plugs and sockets on the controller - should I plug them together

A. No – these must not be connected together.

Q. The replacement controller supplied looks different to the original

A. For certain early models Wisper have had new controllers manufactured with simpler connection arrangements. Details regarding connections will be provided by Wisper service on request. If in doubt contact Wisper service

Q. Where do I obtain spare parts?

A. From Wisper service details of which are included in section 15.

Q. Where do I find the ECN number on the controller?

A. This number will be on the controller label as shown in section 3.6

Q. The LED headlamp is not switching on.

A. See section 9 explaining the differences between the automatic and manually switched lights.

Q. What does the auxiliary controller do on the Alpinos?

A. This controller controls the lights as explained in section 9.

Q. Is the LED headlamp polarity sensitive?

A. Yes. Further details are provided in section 9 and the correct polarity must be observed

Q. What tyre pressure should I use?

A. Information regarding this is included in the user manuals. Also observe any maximum pressure quoted on the tyre.

Q. Can I fit suspension forks to an older 905 Se City?

A. Yes but bear in mind it will also be necessary to change to disc brakes and to fit a disc compatible front wheel

Q. My customer is reporting continued spoke breakage

A. this is normally due to incorrect spoke tensioning. Spokes must be checked at the PDI, the 300 mile service and at regular intervals thereafter.

Q. Can I fit a sealed bottom bracket to early bikes?

A. No.

Q. Are all bottom brackets the same

A. No. Wisper have used a variety of cup and cone type bottom brackets on earlier bikes and sealed cartridge types on 2010 models. Always provide a frame number and model details when ordering replacement parts. Also provide a measurement for the axle length between the bearing shoulders of cup and cone type bottom brackets.

Q. Can I change the overall gearing on bikes fitted with Alfine hubs

A. Yes. Wisper service will be able to advise on what gear options are available.

Q. I cannot get the front wheel to fit between the fork drop-outs on an Alpino model.

A. Check the overall width of the motor including the axle nuts that fit inside the drop-outs and compare to the internal width between the fork drop outs. If the difference is greater than 2mm then contact Wisper service who will provide thinner axle nuts (the internal ones that go inside the drop out). Do not fit these thinner axle nuts on the outside of the drop outs.

Q. How do I remove the rear wheel on bikes fitted with rear motors?

A. Full details are described in section 10.1 of the manual.

Q. The pedals are making a clicking noise.

A. Check the pedal crank retaining nuts (or bolts on later models) are tightened to the torque specified in Annexe 3. Check the condition of the bottom bracket.

16 Glossary

A glossary of electric bike specific terms is included below to assist with providing standardised descriptions of components when discussing fault finding or other issues with customers and Wisper service and when ordering spare parts.

This terminology is also used in the relevant sections of this manual where further information will be found regarding these components and their function.

Standard (non electric) bicycle terms are not included.

Throttle – a twist grip device fitted to the handlebars to activate the electric motor.

LED display – a type of display fitted to the handlebars incorporating individual light emitting diode (LED) status lights and switch functions.

LCD display - a type of display fitted to the handlebars incorporating a liquid crystal display (LCD) providing information to the rider relating to the operating mode of the bike and diagnostic information. Also provides switch functions.

De restrict switch –a green push button fitted to the left hand side of the handlebars which overrides the 15.5mph (25kph) speed limit at which power is normally cut to the electric motor.

Brake cut out switch – a switch incorporated in each brake lever to cut the power to the motor when the brakes are applied.

Front connector box (fcb) – a heart shape connector box fitted to the headstock of the bike where connections form the various handlebar controls are connected to the main wiring loom.

Main wiring loom – a single multicore cable running from the fcb to the bike controller.

Motor – the main electric motor fitted to either the front or rear wheel

Bafang – refers to the manufacturer's name of one of the two motor types used on Wisper bikes

Dapu – refers to the manufacturer's name of one of the two motor types used on Wisper bikes

Sensorless motor - a type of motor, which does not incorporate movement sensors to control the power applied to the motor e.g. the Dapu motor.

Brushless motor- All Wisper motors are brushless, as they do not use carbon brushes to provide power to the motor. Brushes are prone to wear causing possible reliability problems and hence are not used in Wisper motors.

Pedelec sensor – a sensor fitted to the bottom bracket of the bike to detect rotation of the pedal cranks.

Controller – an electronic control unit housed above the bottom bracket of the bike, which takes inputs from all of the above control devices and provides a regulated output to the motor.

Hall Effect – a type of magnetically operated movement sensor used in the throttles, brake cut out switch, pedelec sensor and Bafang motors.

Battery – the main battery fitted to the bike to provide power to the electric motor.

Lithium Ion (polymer) – describes the type of battery material /chemistry and associated construction used by Wisper

Alpino – a model name used by Wisper

Alfine – a trade name used by Shimano for the 8-speed gear hub used on Wisper bikes

17 Training

Wisper is working in partnership with the British Electrical Bike Association (BEBA) and the Cycle industry training organisation CyTech to develop electric bike specific courses and modules with these organisations and it is strongly recommended that dealers ensure technicians are qualified for both conventional cycle and electric bike specific aspects through certified courses offered by CyTech.

Wisper can also provide Dealer based training covering the electric bike specific aspects.

Contact details;

Cytech Training Providers

There are two approved Cytech Technical training providers delivering the full range of courses and qualifications.

ATG

Offer Cytech training and accreditation courses at professional workshop centres in Aylesbury and Manchester. In-store training options are also available through a nationwide network of assessors.

Government funding is available as well as fast-track assessment options.

Visit the ATG website for more details - **www.atg-training.co.uk** - or call 01296 737 815

PJCS

Cytech training and accreditation courses available at a professional workshop in Milton Keynes.

Modular and fast-track training and assessment courses are available.

18 Annexe 1: Chart of Model variations and identifying features

2008 model bikes with older style batteries (see pictures for illustration below table)

Year /Model	705eco	705se	805fe16	805Fe20	905e	905se (3 variants)
Early 2008						
Voltage (volt)	24	36	24	24	36	36
Capacity (Ah)	8	9	8	10	10	14
Wheel size (inch)	26	26	16	20	26	26
Battery case type	Aluminium	Aluminium	Aluminium	Aluminium	Plastic – kettle plug	Plastic – kettle plug
FCB	No	No	No	No	No	No
Hi Lo box on handlebar	No	No	No	No	No	No
Brake switch cut out	2 wire type	2 wire type	2 wire type	2 wire type	2 wire type	2 wire type
Wheel rim type	Plain black square section	Plain back deep wall double section			Plain black square section	Plain back deep wall double section
Motor type	Bafang in rear wheel	Bafang in rear wheel	Bafang in rear wheel	Bafang in rear wheel	Bafang in rear wheel	Bafang in rear wheel

Mid 2008

Voltage (volt)	24	36	24	24	36	36
Capacity (Ah)	8	9	8	10	10	14
Battery case type	Aluminium	Aluminium	Aluminium	Aluminium	Plastic – kettle plug	Plastic – kettle plug
Wheel size (inch)	26	26	16	20	26	26
FCB (3 hole type)	Yes	Yes	Yes	Yes	Yes	Yes
Hi Lo box	Yes	Yes	Yes	Yes	Yes	Yes
Brake switch cut out	3 wire type	3 wire type	3 wire type	3 wire type	3 wire type	3 wire type
Wheel rim type	Plain black square section	Plain back deep wall double section	Plain silver square section	Plain silver square section	Plain black square section	Plain back deep wall double section
Motor type	Bafang in rear wheel	Bafang in rear wheel	Bafang in rear wheel	Bafang in rear wheel	Bafang in rear wheel	Bafang in rear wheel

Above shows batteries fitted to 2008 model 705eco (and 805fe16) and 705se

2009 model bikes with new style batteries (see pictures for illustration below table)

Year /Model	705se	806fe	905eco	905se (3 variants
Mid 2009				
Voltage (volt)	36	24	36	36
Capacity (Ah)	8/14	9	8/14	8/14
Battery case type	Plastic with built in connector	Plastic with built in connector	Plastic with built in connector	Plastic with built in connector
Wheel size (inch)	26	20	26	26
FCB (5 hole type)	Yes	Yes	Yes	Yes
Hi Lo box	Yes	no	Yes	Yes
Brake switch cut out	3 wire type	3 wire type	3 wire type	3 wire type
Wheel rim type	black deep wall double section with yellow Alex rim logo	Plain silver square section	Plain black square section	back deep wall double section with yellow Alex rim logo
Motor type	Bafang in rear wheel	Bafang in front wheel	Bafang in rear wheel	Bafang in rear wheel

2010 model bikes with new style batteries (see pictures for illustration below table)

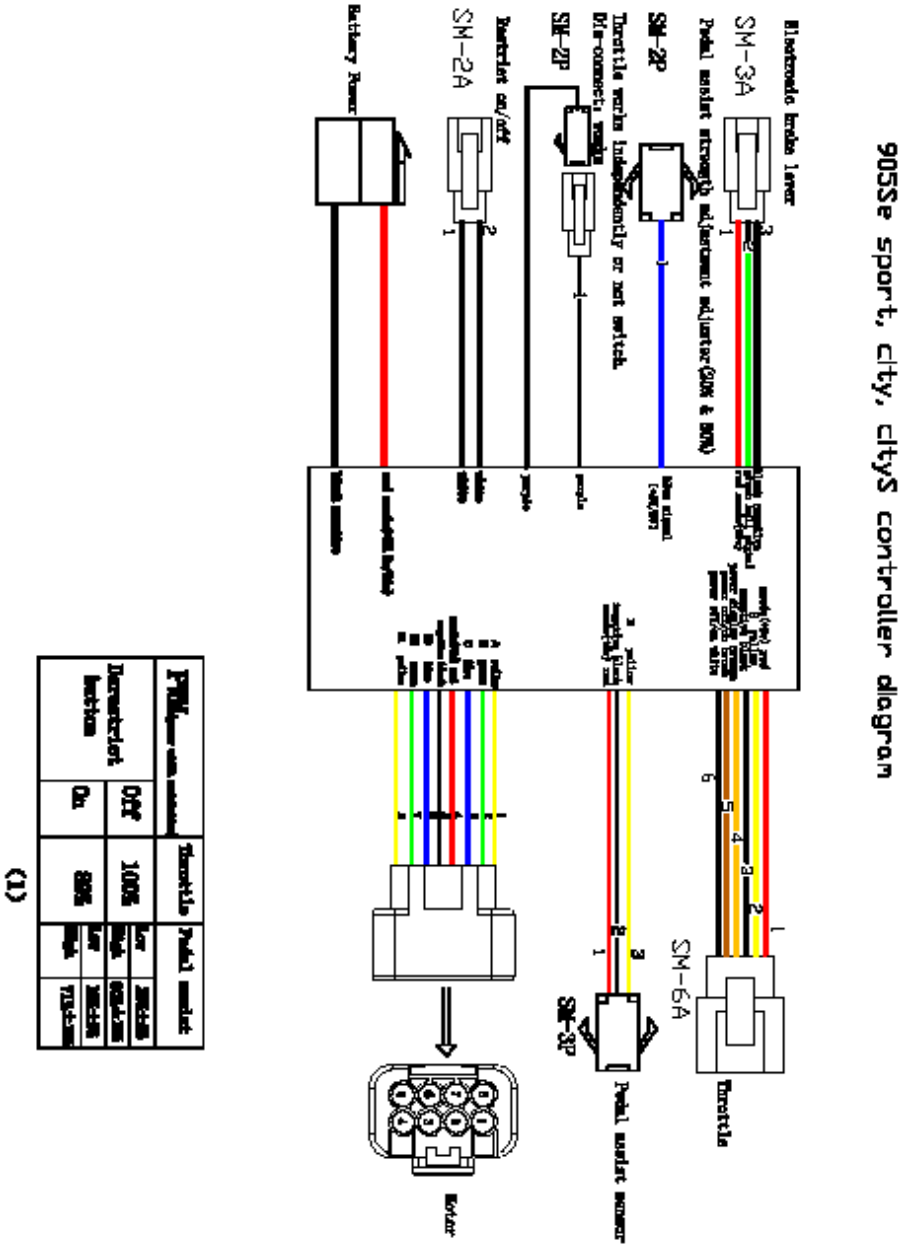
Year /Model	705se	706 Alpino	805fe	806 Alpino	905 (all variants	906 Alpino
2010						
Voltage (volt)	36	36	36	36	36	36
Capacity (Ah)	8/14	8/14	9	9	8/14	8/14
Wheel size (inch)	26	26/28	20	20	26	26/28
Battery case type	Plastic with built in connector	Plastic with built in connector	Plastic with built in connector	Plastic with built in connector	Plastic with built in connector	Plastic with built in connector
FCB	yes	yes	yes	yes	yes	yes
LCD display		yes		yes		yes
LED display	yes		yes		yes	
Brake switch cut out	3 wire type	2 wire type	3 wire type	2 wire type	3 wire type	2 wire type
Wheel rim type	black deep wall double section with yellow Alex rim logo	black deep wall double section with yellow Alex rim logo	Plain black square section		black deep wall double section with yellow Alex rim logo	black deep wall double section with yellow Alex rim logo
Motor type	Bafang in rear wheel	Dapush in front wheel	Bafang in rear wheel	Dapush in front wheel	Bafang in rear wheel	Dapush in front wheel

LED display fitted to non Alpino bikes

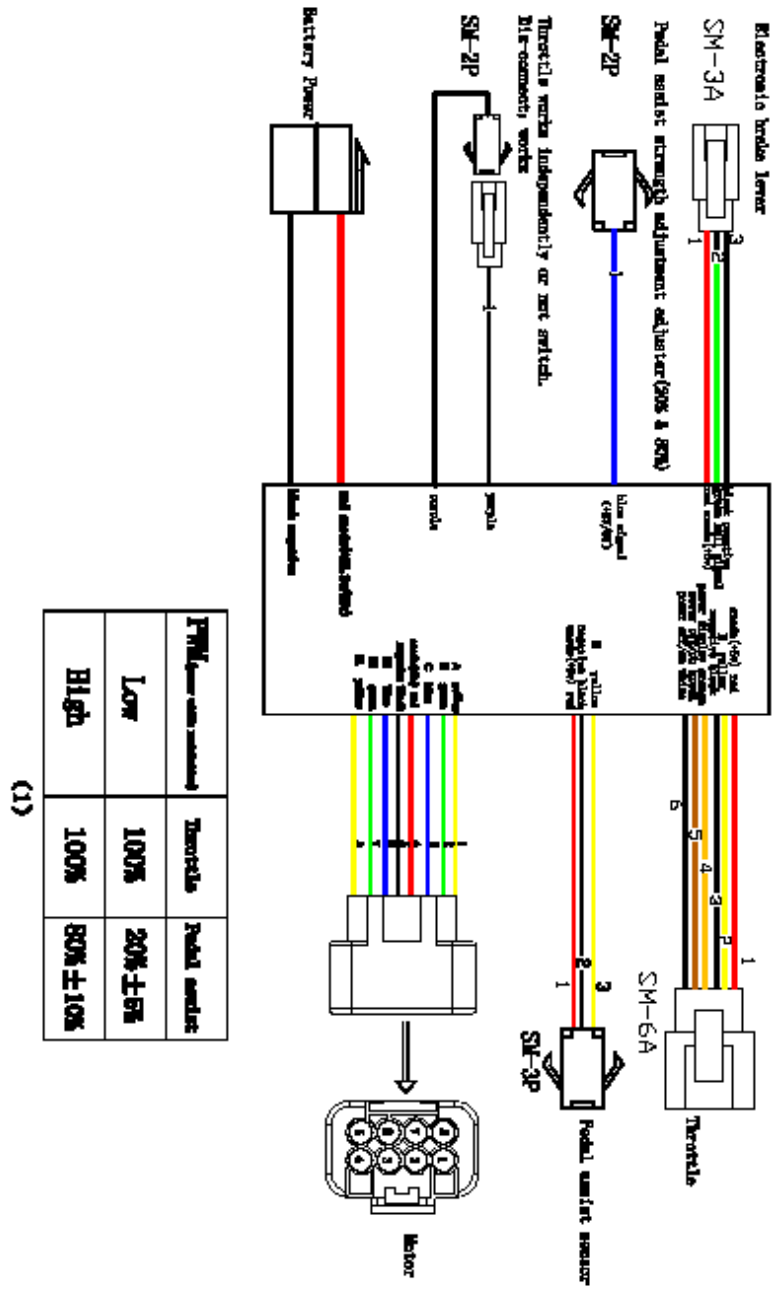
LCD display fitted to Alpino models

19 Annexe 2: Wiring diagrams (Large files are available on request from Wisper Support

19.1 2009 model 705Se, 905Se Sport, City and City S



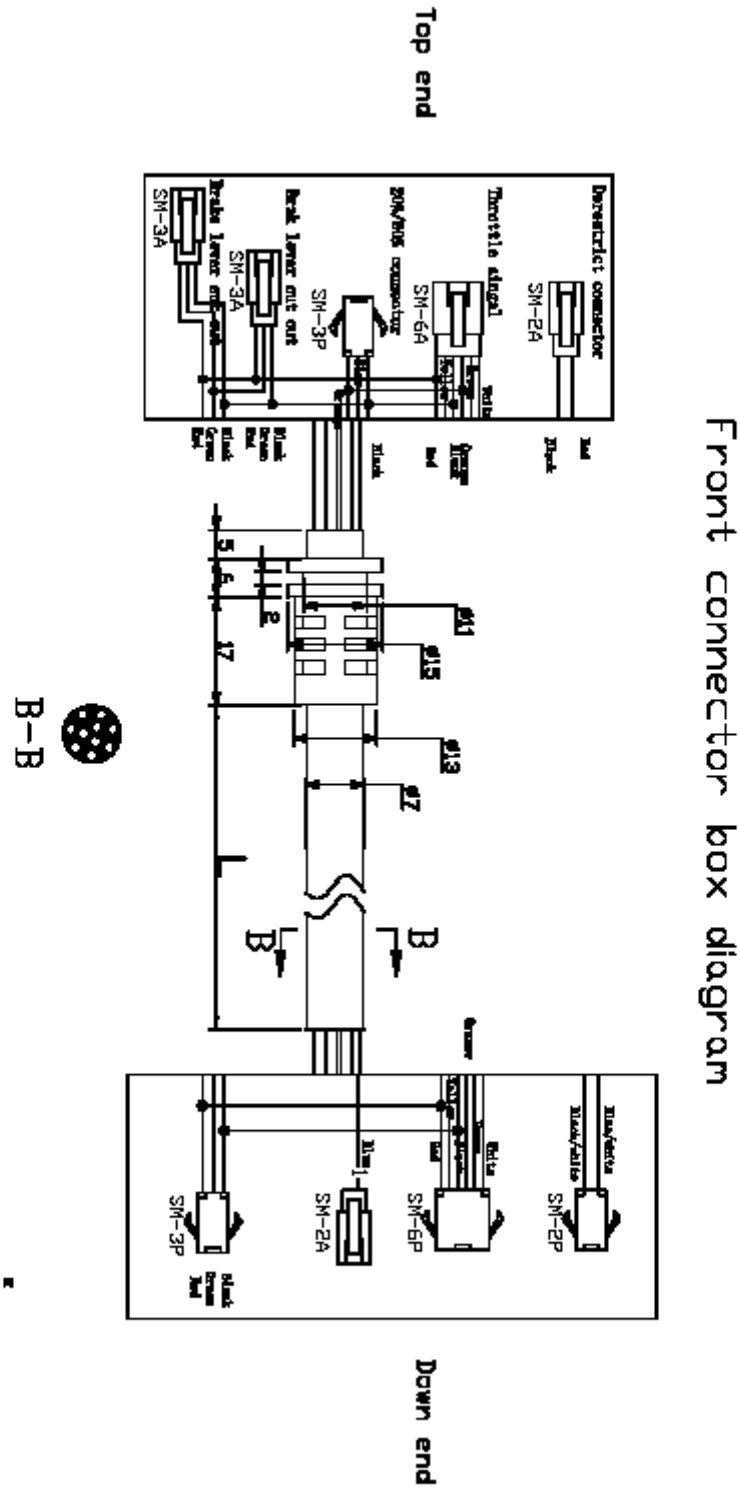
19.2 2009 model 705 and 905 eco



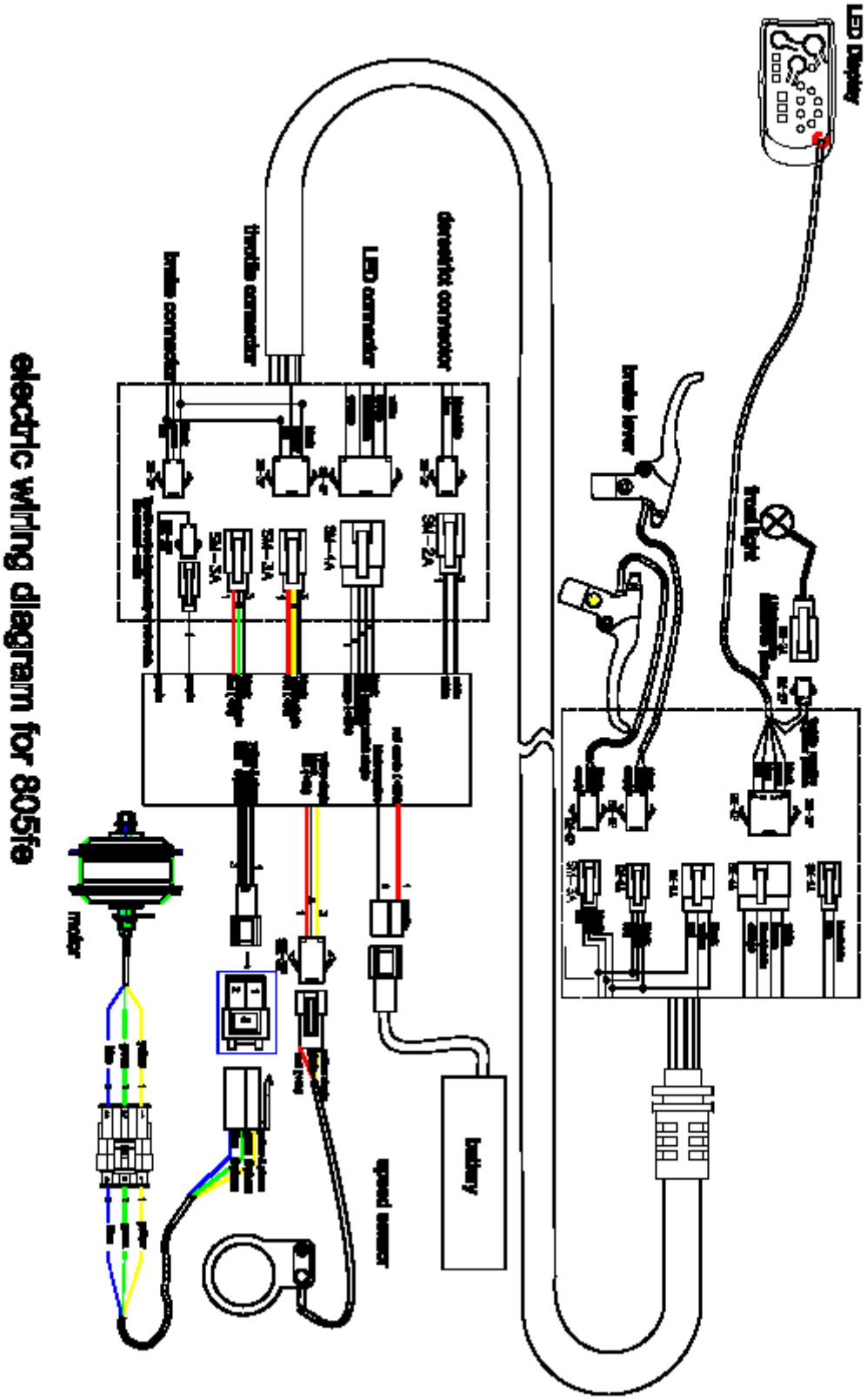
(1)

PWM	Throttle	Pedal assist
Low	100%	20%±5%
High	100%	80%±10%

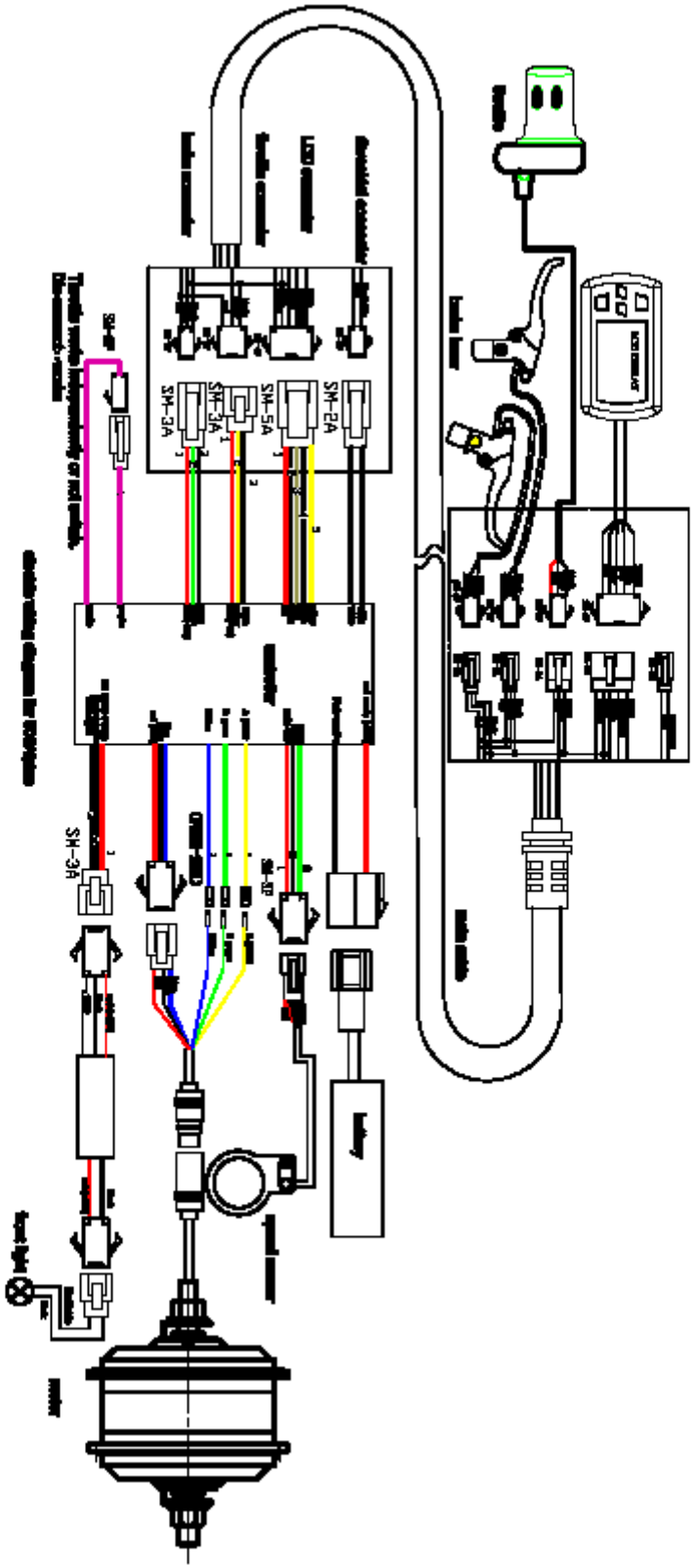
19.3 2009 Model 705 and 905 Front Connector Box



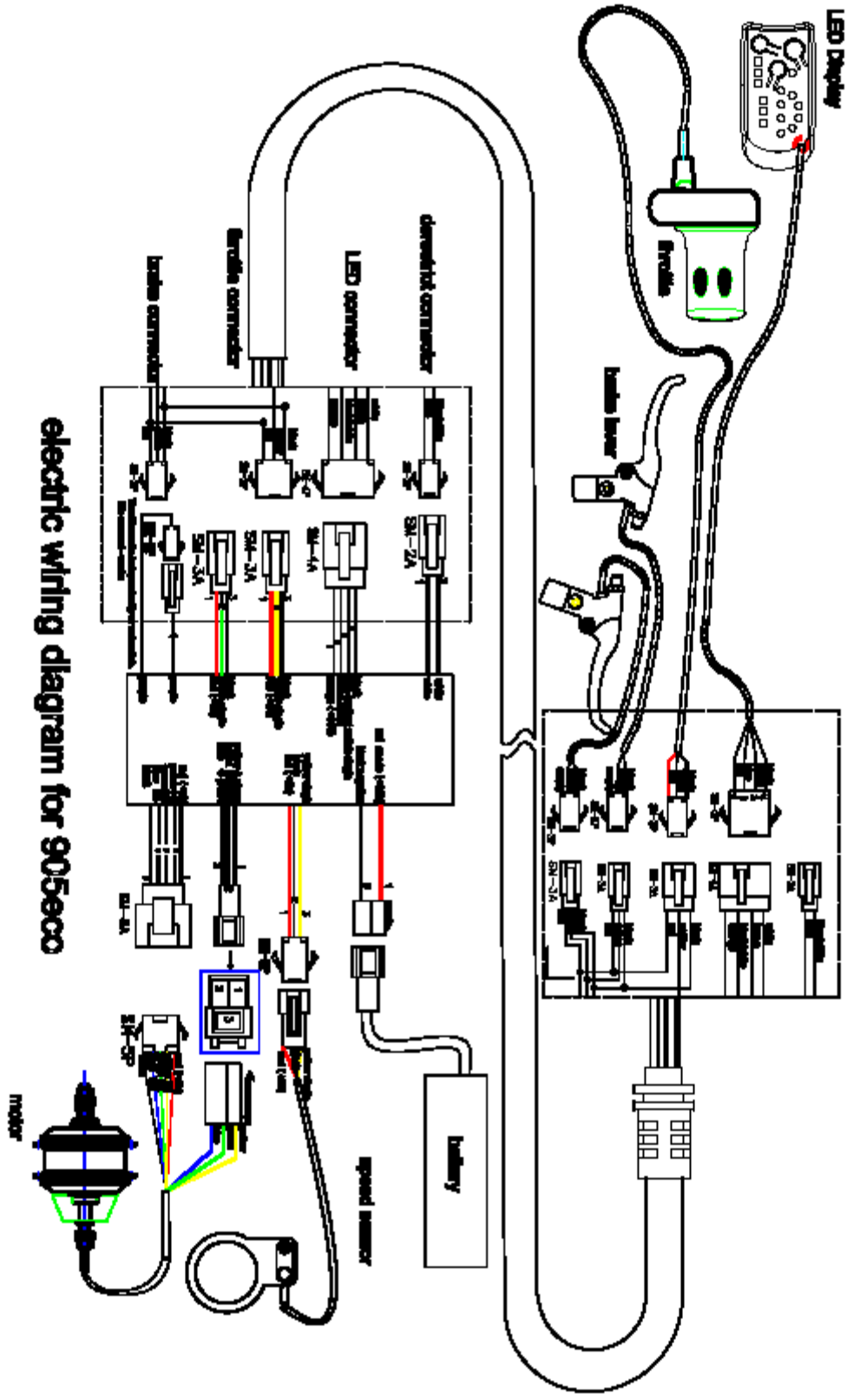
19.4 2010 model 805fe



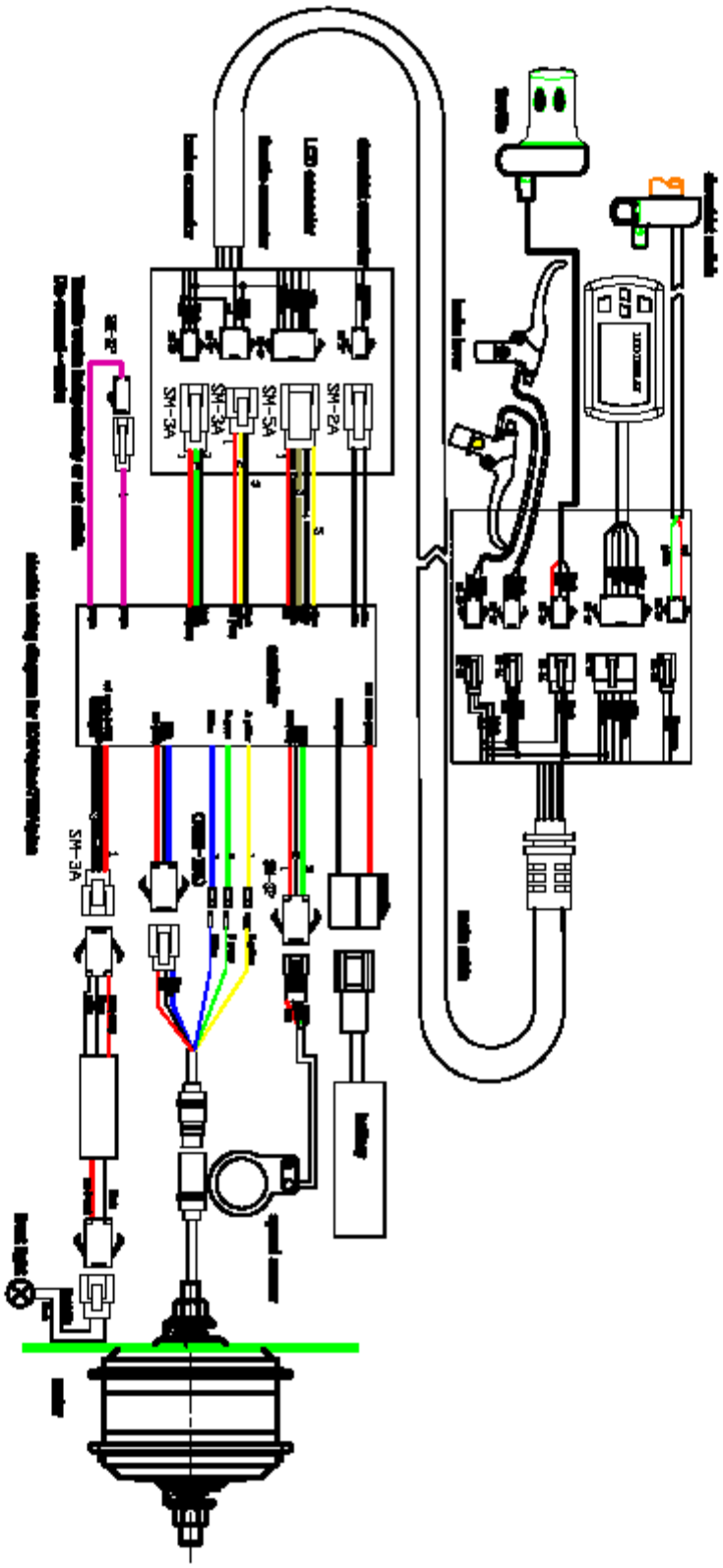
19.5 2010 model 806 Alpino



19.6 2010 model 905eco



19.7 2010 Model 706 Alpino and 906 Alpino



20 Annexe 3: Torque settings.

The following torque settings should be used on Wisper bikes:

(A) Front axle nuts. 70Nm (Alpino), 46Nm (non Alpino)

(B) Back axle nuts. 70Nm (Alpino), 70Nm (non Alpino)

(C)Handlebar clamp bolt. 18 to 20 Nm

(D)Seat pillar clamp nut/bolt. 5-8 Nm

(E)Seat clamp nuts. 24Nm

(F) Gear shifter screws 4Nm

(G) Rear carrier screws. 8Nm

(H) Mudguard bracket nuts 8Nm

(I) pedal cranks 46Nm

For other fixings refer to the user manuals or use the following settings if not specified in the manual based on the thread size.

M4 : 2.5-4.0Nm M5 : 4.0-6.0Nm M6 : 6.0-7.5Nm

21 Annexe 4: Factors affecting Range

The range of an electric bike can vary massively depending on the following factors:

Weight: Not just the weight of the rider but also the weight of any luggage being carried or towed, affects the range you will get from your bike.

Wind resistance: Have you ever wondered why road racers wear Lycra? It's not just to show off muscles! The fact is that if you were to wear Lycra on your electric bike (I don't suggest for a moment that you do!) your range would be much higher than if you were wearing a huge overcoat and a nice big set of panniers!

Tyre Pressures: Always keep your tyres pumped up to the correct pressure, if you have ever had a flat tyre you will know why.

Air temperature: You will get about 15% more range on a warm sunny day than you would in deep winter.

Road conditions: A smooth flat road is much more efficient than gravel or grass for long range.

Hills: I realise you can come down the hill you just went up without using any power but you would have used a lot less power if you covered the same distance on the flat.

Throttle: If you are lucky enough to live in an area that allows throttles without pedalling, you can use masses of power getting from start to cruising speed on the throttle alone. So try always to pedal up to a comfortable speed before you transfer to throttle.

Battery age: As batteries get older they start to lose the ability to hold a charge for as long as they did when they were new. If you are using a 5 year old battery you will not get the same range as when the battery was charged for the first time.

Hint: Recharge a fully depleted battery as soon as is practical. A fully depleted battery left for extended periods can incur irreparable cell damage which will not be covered under warranty. It is the owner's responsibility to maintain their battery as described in the user manual.

Hint: In winter keep your battery inside (at room temperature of 15 deg C or higher) so it is 'warm' when it goes on your bike. This is better for your battery and will give you up to 15% more power for the hills. A cold battery will not discharge as efficiently as a warm battery.

Hint: To maximise the lifespan of your battery, once you have completed the initial deep cycle conditioning process, recharge your battery after every use... Lithium batteries prefer shallow discharge so keeping them topped up is good practice. It also means your bike will always deliver maximum

There are of course other factors such as maintenance and wind speed but these are the most important points to remember.