



#### LIFE Project Number LIFE14 ENV/GR/000858

#### Reporting Date **30/11/2020** (Original Greek Version submitted June 2019)

#### **Promoting and Supporting WEEE Prevention Culture in Greece**

#### Deliverable B6.2.10- Quick Repair Guide for Electrical Appliances

#### (English Version)

#### -Part 2-

(Action B.6.2)

Data Project			
Project location	Greece, Belgium		
Project start date: 01/01/2016			
Project end date: 30/11/2020			
Total budget 2.161.405 €			
EC contribution:	1.247.300 €		
(%) of eligible costs 60 %			
Data Beneficiary			
Name Beneficiary Ανακύκλωση Συσκευών ΑΕ			
Contact person Χάρης Αγγελακόπουλος			
<b>Postal address</b> Λεωφ. Συγγρού 196 & Χαροκόπου 2 17671			
Telephone 2105319762-5			
<b>Fax:</b> 2105319766			
E-mail	E-mail <u>hagelakopoulos@electrocycle.gr</u>		
Project Website	http://www.reweee.gr/el		











#### Development and Demonstration of Waste Electrical & Electronic Equipment (WEEE) Prevention and Reuse Paradigms

Action B.6- Promoting and Supporting WEEE Prevention Culture in Greece

Deliverable B6.2.10- Quick Repair Guide for Electrical Appliances

-Part 2-

LIFE Environment and Resource Efficiency-LIFE14 ENV/GR/000858





English version submitted November 2020

(Original Greek Version submitted June 2019)

The LIFE RE-WEEE project was 60% co-funded by the LIFE+ programme of European Commission. With the financial contribution of the Hellenic Green Fund Disclaimer: The contents of this document do not necessarily reflect the official opinions of the European Commission.











#### Contents

	Summ	ary	4
1.	Port	able-Table Fan	6
	1.1.	General-Operation Principles	6
	1.2.	Indications of Malfunction-Possible Damages	6
	1.3.	Repair Steps	7
	1.3.1	Repairing Damage No 1	8
	1.3.2	Repairing Damage No 2	10
	1.3.3	Repairing Damage No 3	12
	1.3.4	Repairing Damage No 4	14
2.	Mixe	er/Blender-Shredder	18
	2.1	General-Operation Principles	18
	2.2	Indications of Malfunction-Possible Damages	18
	2.3	Repair Steps	19
	2.3.1.	Repairing Damage No 1	20
	2.3.2.	Repairing Damage No 2	24
	2.3.3.1	Repairing Damage No 3	27
	2.3.4.	Repairing Damage No 4	30
	2.3.5. I	Repairing Damage No 5	34
3.	Wat	er Boiler	37
	3.1	General-Operation Principles	37
	3.2	Indications of Malfunction-Possible Damages	38
	3.3	Repair Steps	39
	3.3.1 R	epairing Damage No 1	39
	3.3.2 R	epairing Damage No 2	44
4.	Toas	ster	47
	4.1	General-Operation Principles	47
	4.2	Indications of Malfunction-Possible Damages	47
	4.3	Repair Steps	48
	4.3.1 R	epairing Damage No 1	49
	4.3.2.1	Repairing Damage No 2	53
	4.3.3.1	Repairing Damage No 3	56
	4.3.4.1	Repairing Damage No 4	59











5.	Filt	er Coffee Maker	62
	5.1	General-Operation Principles	62
	5.2	Indications of Malfunction-Possible Damages	64
	5.3	Repair Steps	64
	5.3.1	Repairing Damage No 1	65
	5.3.2	Repairing Damage No2	68
	5.3.3	Repairing Damage No 3	71
6.	Blo	ow Dryer-Hair Dryer	75
	6.1	General-Operation Principles	75
	6.2	Indications of Malfunction-Possible Damages	77
	6.3	Repair Steps	77
	6.3.1.	. Repairing Damage No 1	78
	6.3.2.	. Repairing Damage No 2	80
	6.3.3.	. Repairing Damage No 3	82
	6.3.4.	. Repairing Damage No 4	84
7.	Vad	cuum Cleaner	88
	7.1	General-Operation Principles	88
	7.2	Indications of Malfunction-Possible Damages	89
	7.3	Repair Steps	91
	7.3.1.	. Repairing Damage No 1:	91
	7.3.2.	. Repairing Damage No 2:	96
	7.3.3.	. Repairing Damage No 3:	
	7.3.4.	. Repairing Damage No 4	104
	7.3.5.	. Repairing Damage No 5:	107
8.	Со	rdless phone	112
	8.1	General-Operation Principles	112
	8.2	Malfunction Indications-Possible Damages	112
	8.3	Repair Steps	113
	8.3.1.	. Repairing Damage No 1	114
	8.3.2.	. Repairing Damage No 2:	116
	8.3.3.	. Repairing Damage No 3	119













#### Summary

This document translated from the original Greek. The first part of the quick repair guide concerns repairs for common electronic equipment-small IT and telecommunication equipment. The second part addresses repairs for small equipment-household appliances. Like the 1<sup>st</sup> part, the 2<sup>nd</sup> part of the present guide, describes several malfunction types and the respective repair steps, in order to extend the life cycle of common domestic-use electrical appliances and to prevent their entrance in to the waste stream and specifically the WEEE stream.

This quick repair guide focuses on 8 different types of EEE and several EEE components where malfunctions are more commonly observed. The guide's objective is the demonstration of consecutive steps, that will help users understand how many devices and appliances are can be easily repaired without, in many cases, even requiring new components.

The concise repair guide does not cover all types of malfunctions, as several types of malfunctions demand specialized repair equipment or/and replacement of specialized components. For these types of malfunctions, specialized certified repair technicians must be addressed for the repairs. Furthermore, it should be noted that home repair of an appliance may void the manufacturer's guarantee. Moreover, in cases where an appliance's status (or any other EEE) is considered to be dangerous to undergo repair processes by the owner/user (worn cables, liquid leakage etc.), the assistance of a specialized professional certified technician is required.

Even though the guide is based on professional technicians' expertise, its aim is for informative purposes only. Finally, it must be noted that the users of this guide are exclusively responsible for any issues that result from any repair process they undertake.

In detail, the domestic type of EEE that are presented in this guide, concern appliances that are commonly used in contemporary domestic environments. The appliances are:

- Portable-Table Fan
- Food Mixer/Blender-Shredder
- Water Boiler
- Toaster
- Filter Coffee Machine
- Vacuum Cleaner
- Blow Dryer
- Cordless phone (cellphone)

A basic characteristic of the above referred EEE is that they are considered as standard equipment for every residence and as previously mentioned, pertain to the 5<sup>th</sup> category of the ANNEX II of the 2012/19/EC Directive (excluding the cordless phone), as they are electrical appliances whose external dimension do not exceed the length of 50cm.

The above appliances are further categorized into 3 sub-categories:





- 1. Electrical appliances that contain heating elements in order to transfer thermal load by conduction or convection (i.e. blow dryer, toaster, water boiler, coffee maker etc.)
- 2. Electrical appliances that contain motor configurations in order to transfer mechanical work (i.e. shredder, mixer/blender, portable fan, vacuum cleaner etc.)
- 3. Standard individual EEE components (i.e. on-off switch, metallic wire clips, power supply cables, power supply sockets etc.)

The composition of the repair instructions for the following electrical apparatus, includes the sequence of the following steps:

- 1. Malfunction Indications of an appliance, where evidence indicate that the appliance doesn't work or malfunctions.
- 2. Possible damages, where probable causes of malfunction are presented.
- 3. Repair, where all the necessary repair instructions are mentioned in chronological order for the purpose of repairing the appliance.

The relevant photographic material (pictures etc.) that accompanies the repair instructions for every malfunction per EEE type, were captured on 16-04-2019, after a repair session held in the BIANATT WEEE Sorting Center, by professional certified technicians and the personnel of Ecological Recycling Society NGO and APPLIANCES RECYCLING S.A.

The Sorting Center (SC) was created for the purposes of the LIFE REWEE project. It is the 1<sup>st</sup> WEEE Sorting Center (SC) in Greece, located in Aspropyrgos Attiki, within the premises of BIANATT AE, WEEE management facilities collaborator of the Collective Alternative Management System APPLIANCES RECYCLING S.A.

Warm thanks to the staff of BIANATT S.A. and in particular to the honorable members Karachi C. and Angelopoulos C. for the tour in the BIANATT installations, the repair technical staff of the Sorting Center (SC), which provided the relevant equipment, identified the most important and most common damages and carried out an on-site demonstration of the individual types of EEE listed below.

#### Contact

<u>Offices</u>: 2-4 Mesogeion Avenue 11527 Athens Greece Tel: +30 210 5596010-12 Fax: +30 210 5596013 Email: contact@bianatt.gr <u>Plant:</u> Prari–Moustaki Place 19300 Aspropyrgos Athens, Greece











#### 1. Portable-Table Fan

#### **1.1. General-Operation Principles**

The portable-table fan is an appliance that is being used to create flow in a fluid, typically a gas, such as the air.

The fan consists of a rotating arrangement of blades and the hub, also known as the impeller/rotor, is usually placed inside a protective case, i.e. the front and rear grille. This protective case directs the air flow and/or prevents any objects to enter and/or contact the blades. The rotor is connected to the motor shaft, which rotates its axis when plugged to an electric power supply source (socket). The total of the above referred parts (impeller/rotor/spinner and motor shaft) are placed within a protective frame with external dimension approximately 50-60cm.

Commonly a portable-table fan's maximum dimension does not exceed 50cm. The speed of the impeller is usually controlled by buttons placed on the fan's body. Under the motor shaft there is a mechanism (tightening knob) that allows the user to bend or change the inclination of the impeller. This mechanism is protected by a circular cover. The power input of the fan controlled by an integrated power converter.

In order to meet the requirements of this particular concise repair guide, a small portable-table fan was chosen. The particular fan's characteristics include a fixed speed impeller with an integrated "on-off" switch button.

#### **1.2.** Indications of Malfunction-Possible Damages

The most usual malfunction indications of a portable-table fan and the possible damages that may occur are cited below:

Malfunction		Possible Damage	
No	Indication	No	Possible Cause
1	Incapability to Start (operation failure)	1	Failure of the Terminal of the Start - Pause Switch Function ('on-off' switch)
		2	Failure of the metallic terminal to the Circuit Wiring of the Start – Pause Function
		3	"On-Off" Switch's failure
2	Reduced Impeller's Speed- Noise/s during operation	4	Dust and Residue on the Motor Shaft and the Impeller

Table 1: Malfunction Indications & Possible Damages of a Portable-Table Fan















Image 1: Portable table fan

#### 1.3. Repair Steps

For every single damage that referenced in the above table (Table 1) and relates to a portabletable fan, a number of repair steps are presented below. Every repair step is accompanied with infographic material (photos) in order to provide the user with an overview of the entire repair process.

The repair steps are presented following the ascending numerical order of Table 1.

Before proceeding to any repair steps, it is essential to unplug the appliance from the power supply. This is a necessary precaution measure that needs to be taken during the overall repair process.

Note that for any component replacement (i.e. terminal wires, on-off switch), the new component needs to be the same or equivalent to the old one, meeting the manufacturer's standards (dimensions, functionality etc.). It is advised to take pictures of the appliance's assembly before removing old/damaged components, to prevent any misplacement/misconnection.

The personal protection equipment and tools required for the Table 1 home-repairs are:





- Protective safety gloves in order to protect the hands from edgy or sharp components elements and safety goggles.
- Face mask (preferably a reusable one) in order to protect the respiratory system and prevent any dust or residues entering the body.
- Screwdriver
- Pincers or/and pliers/dart
- Portable Electric air hammer
- Lubricant oil

The repair steps for the damages mentioned in Table 1 concern repairs that the owner-user is capable of performing by using common tools. If the owner-user does not want to repair the appliance, there's always the option of contacting a professional certified technician. Likewise, if a damage isn't cited in Table 1, or the repair steps do not seem to apply and/or the appliance still doesn't function, the owner-user may, again, contact a professional technician. Note that, it is always advised to reach a professional certified technician that specializes on repairing electrical equipment/appliances/apparatus.

#### 1.3.1 Repairing Damage No 1

In order to repair damage No 1, the required equipment includes:

- Screwdriver
- Pincers or a pliers/dart

Malfunction: Operation failure, possibly caused by the failure of the terminal of the on-off switch. (Table 1: Possible Causes column)

Step 1: Disconnect the appliance from the power supply.

Step 2: Disconnect the "on-off" switch, located at the external rear protective plastic grille of the fan, from the terminal wiring connection.









Step 3: Reconnect the metallic terminal that was disassembled from the "on-off" switch.



Step 4: Reconnect the on-off switch to the terminal found in the external rear plastic grille of the fan.



Step 5: Connect the fan to the power supply.





#### **1.3.2** Repairing Damage No 2

In order to repair damage No 2 the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- Metallic terminal of the same dimensions and technical specifications as the damaged one

Malfunction: Operation failure, possibly caused by a failure of the metallic terminal of the circuit wiring of the Start – Pause Function. (Table 1: Possible Causes column)

Step 1: Unplug the appliance from the power supply.

Step 2: Disconnect the on-off switch from the metallic wiring connection (located at the rear external plastic grille of the fan).



Step 3: Remove the damaged metallic wiring connection from the "on-off" switch.





Step 4: Connect the new metallic wiring connection, first with the motor shaft's wire, and then with the terminal of the on-off switch.



Step 5: Reassemble the "on-off" switch and the terminal wiring at the rear external plastic grille.













Step 6: Connect the fan to the power supply.

Step 7: Dispose the damaged part at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

#### 1.3.3 Repairing Damage No 3

In order to repair damage No 3 the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- "On-Off" switch of the same dimensions and technical specifications as the damaged one

Malfunction: Operation failure, possibly caused by a damaged "On-Off" switch (Table 1: Possible Causes column)

Step 1: Unplug the appliance from the power supply.

Step 2: Disassemble the damaged "On-Off' switch from the terminal located at the rear external plastic grille of the fan.







Step 3: Remove the damaged terminal from the terminal wiring of the motor shaft.



Step 4: Connect the metallic terminal of the new switch to the according terminal wiring of the motor shaft.









Step 5: Reconnect the switch to the terminal at the rear external plastic grille of the fan.



Step 6: Connect the fan to the power supply.

Step 7: Dispose the damaged part at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

#### 1.3.4 Repairing Damage No 4

In order to repair damage No 4, the following equipment is required:

- Screwdriver
- Portable Electric air hammer
- Lubricant oil

Malfunction: Reduced Impeller's speed, possibly caused by dust and residues on the motor shaft and/or the impeller.

Step 1: Disconnect the appliance from the power supply.















Step 2: Detach the front external plastic grille of the fan.



Step 3: Detach the on-off switch and the terminal wiring from the rear external plastic grille of the fan.







Step 4: Remove the hub along with the blades

Step 5: Use the portable electric air hammer to remove any dust or residues from the motor shaft or the impeller. It is advised to proceed with this particular step outdoors or in a well-ventilated area.

Step 6: Apply some lubricant oil on the motor shaft and the impeller with your finger.



Step 7: Place the hub along with the blades on the motor shaft and the impeller.











Step 8: Reassemble the on-off switch and the terminal connection at the rear external plastic grille of the fan.



Step 9: Reassemble the front external plastic grille of the fan.



Step 10: Connect the fan to the power supply.





#### 2. Mixer/Blender-Shredder

#### **2.1 General-Operation Principles**

The domestic-use blender- shredder is an appliance used for the homogenization in food preparation. Its operation is based on the rotation of the rotor which is connected with the cylindrical shaft - the motor shaft, where the fixed/detachable homogenization-shredding tools, called blades, are attached.

The rotation speed of the motor shaft can be adjusted by a switch. Even though motor power varies, it is suggested that the higher the power, the less the blender is susceptible to damage. A general rule for choosing a domestic-use blender-shredder, in terms of durability, is to select a motor with a power/wattage greater than 250Watt.

The main electrical circuit of the household blender-shredder consists of the motor shaft, an on-off switch ("on – off' switch), the rotational speed control, the safety switch and the electric power supply cable (plug). The safety switch is a part of the circuit and protects the blender's motor against overheating. Specifically, in cases where the blades cannot dissect the food material, due to increased mechanical resistance, the safety circuit automatically shuts off the motor to protect it against overheating and consequently failure. For the purposes of the present repair guide, a small-sized fixed-speed blender with an "on-off" switch and a safety circuit has been selected.

#### 2.2 Indications of Malfunction-Possible Damages

Like the portable-table fan, mixer-blender appliances show similar types of damages. The only difference is that due to the varying power required to be used during blending/shredding, these appliances feature a safety circuit to protect the motor against overheating and ultimately failure. This circuit is activated when the power required for shredding is greater than the nominative motor power. The most common malfunction indications of a mixer-blender and the possible damages are listed in the table below.

Malfunction		Possible Damage	
No	Indication	No	Possible Cause
1	Operation failure	1	Start-up Circuit Wiring Interface Metal Terminal Wiring Failure Failure of the metallic terminal to the "on-off" switch's circuit
		2	Failure of the on-off switch ('on-off' switch)
		3	Failure of the metallic terminal of the Safety Circuit
		4	Failure of the Safety Switch
2	Rotation failure and/or reduced blades' rotation speed	5	Accumulation of dry particles on the on-off switch and/or on the motor shaft where it connects to the blade rotation shaft

Table 2: Indications of Malfunction & Possible Damages of a Mixer/Blender-Shredder













#### 2.3 Repair Steps

Repair steps are presented below for the damages cited in Table 2. Every repair step is accompanied with infographic material (photos) in order to provide the user with an overview of the repair process.

The repair instructions follow the ascending numerical order of Table 2.

Before proceeding to the repair instructions, it is essential to remove the appliance from the power supply. This is a necessary precaution measure that needs to be followed during the overall repair process.

Keep in mind that for any component replacement (i.e. terminal wires, on-off switch), the new component needs to be the same or equivalent to the old one meeting the manufacturer's standards (dimensions, functionality etc.). It is advised to take pictures of the appliance's assembly, before removing the old/damaged component, in order to prevent any malfunctions when placing the new part.

The personal protection equipment and tools required for the home repairs presented in Table 2 is the following:

- Protective safety gloves in order to protect the hands from edgy or sharp components elements and safety goggles.
- Screwdriver
- Pincers or/and pliers/dart
- Voltmeter to run diagnostics
- Edgy/sharp instrument (i.e. knife)

The repair steps for the damages mentioned in Table 2 can be followed by the owner-user by using only common tools. If the owner-user does not want to home-repair the appliance, there's always the option of contacting a professional certified technician. Likewise, if a damage isn't cited in Table 2, or the repair steps do not seem to apply and/or the appliance still doesn't function, the owner-user should, contact a professional technician. Note that, it is always advised to contact a professional certified technician that specializes on repairing electrical equipment/appliances/apparatus.













Image 2: Mixer/Blender-Shredder

#### 2.3.1. Repairing Damage No 1

In order to repair damage No 1, the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- A metallic terminal for the on-off circuit of the same technical specifications as the damaged one.

In case of operation failure, possibly due to a failure of the metallic terminal wiring's connection to the "on-off" switch's circuit, it is recommended to follow the steps bellow:

Step 1: Disconnect the appliance from the power supply.











Step 2: Detach the plastic protective case from the plastic support frame, where the startup switch, on-off circuit, motor and safety circuit are located.













Step 3: Remove the on-off switch and the terminal of the on-off circuit from the plastic support frame.



Step 4: Remove the damaged metallic wiring from the on-off switch wiring.







Step 5: Connect the new metallic terminal, firstly to the terminal wiring of the motor shaft and then to the terminal wiring of the on-off switch.

Step 6: Place the on-off switch and the terminal of the corresponding circuit back in the plastic support frame.



Step 7: Reattach the plastic protective case to the plastic support frame, that contains the onoff switch, on-off circuit, motor shaft and safety circuit.



Step 8: Connect the appliance to the power supply.

Step 9: Dispose the damaged part at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.





#### 2.3.2. Repairing Damage No 2

In order to repair damage No 2, start-pause the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- Voltmeter to run diagnostics
- On-off switch ("on-off" switch) with the same technical specifications as the damaged one.

For an operation failure possibly caused by a failure of the metallic terminal of the on-off circuit, it is recommended to follow the steps below:

Step 1: Disconnect the appliance from the power supply.

Step 2: Detach the plastic protective case from the plastic support frame where the startup button, on-off circuit, motor shaft and safety circuit are located.



Step 3: Check the motor shaft's terminal wiring connection to the on-off switch wiring. If there is a failure in one or/ both connector wires, follow the procedure described in Section 2.3.1.





Step 4: Connect the voltmeter's terminal to the two terminals of the on-off switch. If electricity is detected, the failure relates to the safety switch and the procedure described in Section 2.3.4 shall be followed.



Step 5: Remove the on-off switch and the terminal connection of the corresponding circuit from the plastic support frame.

Step 6: Disconnect the terminal connections of the on-off switch from the switch's body and remove the damaged switch.

Step 7: Connect the terminal connections to the new on-off switch.











Step 8: Place the on-off switch and the terminal connections of the corresponding circuit in the plastic support frame.



Step 9: Assemble protective case with the plastic support frame, within which the startup switch, on-off circuit, motor and safety circuit are located.















Step 10: Connect appliance to the power supply.

Step 11: Dispose the damaged part at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

#### 2.3.3. Repairing Damage No 3

In order to repair damage No 3, the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- A metallic terminal for the safety circuit of the same dimensions and technical specifications as the damaged one.

In case of operation failure, possibly be due to a failure of the metallic terminal of the safety circuit, it is recommended to follow the steps below:

Step 1: Disconnect the appliance from the power supply.

Step 2: Detach the plastic protective case from the support frame, within which the startup button, on-off circuit, motor and safety circuit are located.













Step 3: Remove the safety switch circuit and the terminal connection of the corresponding circuit from the plastic support frame.



Step 4: Remove the terminal from the terminal wiring of the safety switch.







Step 5: Connect the new terminal first to the terminal wiring of the motor and then, to the terminal wiring of the safety switch.

Step 6: Place the safety switch and the terminal of the corresponding circuit in the plastic support frame.













Step 7: Assemble the plastic protective case to the support frame, within which the startup button, on-off circuit, motor and safety circuit are located.



Step 8: Connect appliance to the power supply

Step 9: Dispose the damaged part at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

#### 2.3.4. Repairing Damage No 4

In order to repair damage No 4, the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- Safety switch with dimensions and technical specifications similar to that damaged.





In case of operation failure the mixer- blender, which may be due to failure of the safety switch it is recommended to follow the steps below:

Step 1: Disconnect the appliance from the power supply.

Step 2: Detach the plastic protective case from the plastic support frame, where the startup button, on-off circuit, motor and safety circuit are located.



Step 3: Check the terminals connecting the wiring of the motor and the on-off switch. In the case of failure of one or both terminals, follow the instructions described in section 2.3.3.

Step 4: Place the terminals of voltmeter to the two terminals of the on-off switch. If electricity is detected, the failure relates to the safety switch. The instructions described in section 2.3.2. should be followed.





Step 5: Place the safety switch and the terminals of the corresponding circuit in the plastic support frame.



Step 6: Disconnect the terminal the wiring connection of the damaged switch from the switch's body and remove the damaged switch.











Step 7: Connect the terminal with the new safety switch.

Step 8: Place the safety switch and the wiring of the corresponding circuit in the plastic support frame.











Step 9: Assemble the protective case with the plastic support frame, within which the startup button, on-off circuit, the motor and safety circuit are located.



Step 10: Connect the plug of the mixer-blender to the power supply.

Step 11: Dispose the damaged part at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

#### 2.3.5. Repairing Damage No 5

In order to repair damage No 5, the following equipment is required:

- Screwdriver
- Sharp metallic object (e.g., knife)

In the case of rotation inability and/or reduced blade rotation speed, which may be due to accumulation of dry particles on the on-off switch and/or on the motor shaft at the connection point with the blade rotation shaft, which complicates the interaction between these components. It is recommended that the following steps shall be followed:

Step 1: Disconnect the appliance from the power supply.





Step 2: Detach the plastic protective case from the plastic support frame, where the startup button, on-off circuit, motor and safety circuit are located.



Step 3: In order to clean the interface between the startup button and plastic protective case, use a sharp object to remove the dry particles accumulated due to the use of the mixer-blender.






Step 4: In order to clean the interface between the motor shaft and the rotor of the blades, use a sharp object to remove the dry particles accumulated due to the use of the mixer-blender.



Step 5: Assemble the plastic protective case with the plastic support frame, within which the startup button, on-off circuit, the motor and safety circuit are located.



Step 6: Connect the appliance to the power supply.





### 3. Water Boiler

### **3.1 General-Operation Principles**

A water boiler is an electrical domestic-use appliance, that boils water very quickly and efficiently. By using this appliance, a liter of water reaches the boiling point in only a minute. Domestic-use water boilers have a capacity of one or two liters and a heating capacity between 600 and 3000 Watt. The heating element is located inside the water boiler and has the shape of submerged surface of a bottom plate.

All contemporary water boiler models are provided to the market with or without a power wire in the water container. The water boilers without a power supply wire, the water container is placed on a base with a socket that connects to the power supply via wiring. The water container is removable from the base. The electrical connection to the base often includes a cylindrical contact arrangement, which activates the automatic pause mechanism when the water container is removed from the base before the water reaches the boiling point. This prevents inadvertent overheating when the empty water container is replaced on the base. A thermostat automatically deactivates the appliance when an intermetallic plate (sensor) is heated by steam and its temperature exceeds 90°C. For the proper operation of this particular deactivation mechanism, the lid must be closed, otherwise the steam will escape and therefore the required temperature will not be reached. But even with this safety mechanism, water boilers must never operate without supervision.

Beside the two previously referred variants of the water boiler (with or without a wire), water boilers shall be distinguished between those fitted with a covered heating element and those to which this component is exposed. The exposed heating element that is integrated into the bottom of the water boiler saves space and it's silent. Usually, when the water that boils is about to reach the boiling point, a boiling sound may be heard. On these models, salts are deposited directly on the radiator of the heating element. On the other hand, a covered heating element or a heating bottom has a better appearance, but the bubbles that emerge throughout the heating process make more noise. In this type of appliance, salts appear in the form of small flakes that float in the water when detached from the bottom of the water container with the heating element.

For the requirements of this concise repair guide, a domestic water boiler was selected where a power supply socket is connected to the base (and not the water container) and in addition, the heating element is covered, below the (heating) bottom of the water container.













Image 3: Water Boiler

### **3.2 Indications of Malfunction-Possible Damages**

The water boiler belongs to the category of domestic-use appliances that contain a heating element, for the purpose of transferring heat through conduction or convection in a liquid medium (in this case water). In comparison to the malfunctions of appliances that operate using a motor, the damage concerning this type of appliances that use a heating element, usually relate to the terminal wiring between the on-off circuit and the heating element. Also, in most cases, with regard to water boilers the on-off switch is integrated in the base and is not a detachable component (such as the portable-table fan and/or mixer-blender). The most common indications of malfunction that relate to a water boiler and the possible damages are listed in the table below.

Malfunction		Possible Damage			
No	Indication	No	Possible Cause		
1	Operation failure	1	Failure of the terminal (wiring) Wiring connection to the heating element's circuit that connects to the water container		
2	Boiling time greater than expected	2	Accumulation of Salts in the Cylindrical Contact Device of the Boiler Base and/or the Water Container		

Table 3: Malfunction Indications & Possible Damages of Water Boiler











### 3.3 Repair Steps

For every single damage that is being referred in the above cited table (Table 3) and relate to a water boiler, a number of repair steps are mentioned below. Every repair step is accompanied with infographic material (photos) in order to provide the user with an overview of the repair process.

The repair steps are provided according the ascending numerical order of the previous table (Table 3)

Before proceeding to any repair steps, it is essential to remove the appliance and unplug it from the power supply. This is a necessary precaution measure that needs to be taken during the overall repair process.

Moreover, keep in mind that for any component replacement (i.e. terminal wires, on-off switch), the new component needs to be the same or equivalent to the old one meeting the manufacturer's standards (dimensions, functionality etc.). It is advised to take pictures of the appliance's assembly, before removing the old/damaged component, in order to prevent any malfunctions when placing the new part.

The advised personal protection and tool equipment in order to repair according the reference of Table 3 are:

- Protective safety gloves in order to protect the hands from edgy or sharp components elements and safety goggles.
- Screwdriver
- Pincers or pliers/dart
- Edgy/harp Instrument (i.e. knife)

The repair steps for the damages mentioned in Table 3 can be followed by the owner-user by using only common tools. If the owner-user does not want to repair the appliance, there's always the option of contacting a professional certified technician. Likewise, if a damage isn't cited in Table 3, or the repair steps do not seem to apply and/or the appliance still doesn't function, the owner-user may, again, contact a professional technician. Note that, it is always advised to contact a professional certified technician that specializes on repairing electrical equipment/appliances/apparatus.

### 3.3.1 Repairing Damage No 1

In order to repair damage No 1, the required equipment includes:

- Screwdriver
- Pincers or pliers/dart
- A metallic terminal for the on-off circuit of the same technical specifications as the damaged one.











Malfunction: Operation failure, possibly caused by failure of the metallic terminal of the heating element circuit that connects to the water container.



Step 1: Remove the water container from the power supply base.

Step 2: Detach the plastic protective case from the bottom of the water container in order to access the circuit between the heating element and the cylindrical arrangement of the power supply.







Step 3: Detach the terminal that connects the heating element to the cylindrical arrangement of the power supply of the water container (base-container contact).



Step 4: Remove the damaged metallic terminal.

Step 5: Connect the new terminal.









Step 6: Assemble the terminal wiring between the heating element and the cylindrical power supply of the water container (base-container contact).













Step 7: Assemble the plastic protective case at the bottom of the water container.



Step 8: Place the water container on the power supply base.



Step 9: Dispose the damaged part at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.





#### 3.3.2 Repairing Damage No 2

In order to repair damage No 2, the equipment requirements shall include:

- Screwdriver
- Sharp/ Edgy Object (e.g., knife)

Malfunction: Boiling time greater than the expected, possibly caused by Accumulation of Salts in the Cylindrical Contact Device of the Boiler Base and/or the Water Container

Step 1: Disconnect the appliance from the power supply.

Step 2: Remove the water container from the power supply base.







Step 3: In order to clean up the power supply's cylindrical arrangement at the base of the water boiler (container-base contact), remove the salts accumulated utilizing the sharp/edgy instrument.















Step 4: In order to clean the cylindrical supply appliance at the base of the water container (base-container contact), remove the salts that have accumulated in the cylindrical surfaces of the appliance using a sharp object.



Step 5: Place the water container on the power supply base.

Step 6: Connect the plug of the water boiler to the power supply.













### 4. Toaster

### **4.1 General-Operation Principles**

The toaster is an electrical appliance of domestic use that is used to toast bread slices. The toasting procedure due to two metallic plates in the appliance's body that are usually removable. These metallic plates are programmed to be uniformly heated when the owner-user places bread slices on the heating plates in order to toast them evenly.

The operation principles of the toaster are based on the power supply that occurs by the connection to an electrical circuit of two heating elements which are by order connected to each of the flat plates of the toaster. A thermostat is attached to one of the flat plates. So, when the temperature of the plates raises to a certain standard level (depending on the appliance's operation programming) the thermostat turns off the heating elements of the plates and the heating procedure stops. More particularly, the power supply is directed from the power supply socket towards the thermostat and then to the heating elements in order to convert the power into heating power. Moreover, the thermostat, transmits an electrical signal to a lamp placed on the appliance outer body in order to inform the owner-user that the toasting process is completed.

Some toasters have more than one heating programs in order to satisfy different needs. Varying types of bread and personal preferences may require a different browning setting. However, most of the appliances operate at an 170°C maximum heating temperature with a thermostat programmed to turn off the heating when the maximum heating capacity is reached. Moreover, some of the toasters have an on-off switch with a circuit that functions between the power supply socket and the wiring circuit of the heating elements.

In order to meet the demands of this particular concise guide, a regular toaster that operates with a single heating function, with a thermostat and a lamp, but not with an on-off switch was selected.

### 4.2 Indications of Malfunction-Possible Damages

Like the water boiler, the toaster, also belongs to the categories of domestic use appliances that contain a heating element, in order to transfer thermal load to a solid medium, in this case, to bread. In contrast with the malfunctions that occur related to the metallic terminals' inexpediencies that were referred in the previous chapter (water boiler), the corresponding malfunctions of a toaster directly concern the wiring circuit between the power supply wiring and the heating elements, having in mind that the majority of these cases doesn't have an on-off switch. Furthermore, even though the boiler's heating procedure automatically stops when the heating capacity is reached, the toasters' heating procedure stops when the light of the lamp transmits an optical signal to the user.

The most common malfunction indications of a toaster and the possible damages are cited in the following table.







Malfunction		Possible Damage	
No	Indication	No	Possible Cause
1	Incapability to Start (operation failure)	1	Failure of the Terminal Connection of the Heating Elements
		2	Thermostat Failure
		3	Misconnection of the Power Supply Wiring
2	Toasting Failure	4	Lamp's Failure

#### Table 4: Indications of Malfunction & Possible Damages of a Toaster

#### 4.3 Repair Steps

For every single damage that referred in the above table (Table 4) and relate to a toaster, a number of repair steps are mentioned. Every repair step is accompanied with infographic material (photos) in order to provide the user with an overview of the repair process.

The repair steps are provided according to the ascending numerical order of the previous table (Table 4)

Before proceeding to any repair steps, it is essential to remove the appliance from the power supply. This is a necessary precaution measure that needs to be taken during the overall repair process.

Moreover, keep in mind that for any component replacement (i.e. terminal wires, lamps etc.), the new component needs to be the same or equivalent to the old one, meeting the manufacturer's standards (dimensions, functionality etc.). It is advised to take pictures of the appliance's assembly, before removing the old/damaged component, in order to prevent any malfunctions when placing the new part.

The advised personal protection and tools equipment in order to home-repair according the reference of Table 4 is:

- Protective safety gloves in order to protect the hands from edgy or sharp components elements and safety goggles
- Screwdriver
- Pincers or/and pliers/dart











The repair steps for the damages mentioned in Table 4 can be followed by the owner-user by using only common tools. If the owner-user does not want to home-repair the appliance, there's always the option of contacting a professional certified technician. Likewise, if a damage isn't cited in Table 4, or the repair steps do not seem to apply and/or the appliance still doesn't function, the owner-user may, again, contact a professional technician. Note that, it is always advised to reach a professional certified technician that specializes on repairing electrical equipment/appliances/apparatus.



Image 4: Toaster

#### 4.3.1 Repairing Damage No 1

In order to repair damage No 1, the required equipment includes:

- Screwdriver
- Pincers or a pliers/dart
- Metallic Terminal of the Heating Element equivalent to the damaged one.

Malfunction: Operation failure, possibly caused by a failure of the terminal of the heating elements. (Table 4: Causes Column)











Step 1: Disconnect the appliance from the power supply.



Step 2: Detach the metallic plates from the frame of the toaster in order to have access to the connection wiring inside the toaster's body, where the thermostat, the heating elements and the lamp are connected with a wiring circuit.











Step 3: Proceed to an audit of the wiring connections in order to point the damaged one.



Step 4: Detach and remove the damaged terminal.













Step 5: Connect the new terminal of the heating element.

Step 6: Place the connection wiring with heating element. Be careful, the wiring must not contact the heating element.



Step 7: Reassemble the metallic plates in the frame of the toaster.











Step 8: Connect the toaster to the power supply.

Step 9: Dispose of the damaged component(s) at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

#### 4.3.2. Repairing Damage No 2

In order to repair damage No2 the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- Thermostat with dimension and functionality equivalent to the damaged one

Malfunction: Operation failure, possibly caused by a failure of the thermostat.

Step 1: Disconnect the appliance from the power supply.













Step 2: Detach the metallic plates from the frame of the toaster in order to have access to the connection wiring inside the toaster's body, where the thermostat, the heating elements and the lamp are connected with a wiring circuit.



Step 3: Detach and remove the damaged thermostat.







Step 4: Place the new thermostat in the interior of the toaster and connect its terminal to the terminal of the heating elements and the lamp.



Step 5: Place the connection wiring of the heating elements accordingly in the interior of the toaster. Be careful, the wiring must not contact the heating elements.









Step 6: Reassemble the metallic plates in the frame of the toaster.



Step 7: Connect the appliance to the power supply.

Step 8: Dispose of the damaged component(s) at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

#### 4.3.3. Repairing Damage No 3

In order to repair damage No 3, the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- Metallic terminal circuit wiring for the power supply of the same technical specifications as the damaged one

Malfunction: Incapability to start, possibly caused by a faulty connection in the power supply wiring.













Step 1: Disconnect the appliance from the power supply.



Step 2: Detach the plastic protective case from the bottom part of the toaster's body, in order to access circuit wiring connections of the power supply (phase - red colored wire, neutral - blue colored wire, grounding - yellow colored wire).













Step 3: Proceed to an audit of the wiring connections' status for every wiring connection by removing the protective case in order to indicate the damaged terminal.

Step 4: Detach and remove the damaged terminal.



Step 5: Connect the new metallic terminal and reassemble the protective case.

Step 6: Place the power supply's wiring connections accordingly.

Step 7: Reassemble the plastic protective case in the frame of the toaster's body.













Step 8: Connect the appliance to the power supply.

Step 9: Dispose of the damaged component(s) at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

#### 4.3.4. Repairing Damage No 4

In order to repair Damage No 4, the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- Lamp with metallic terminal of the same technical specifications as the damaged one

Malfunction: Toasting failure, possibly caused by the lamp's failure to indicate that the toasting is complete.

Step 1: Disconnect the appliance from the power supply.



Step 2: Detach the metallic plates from the frame of the toaster in order to have access to the connection wiring inside the toaster's body, where the thermostat, the heating elements and the lamp are connected with a wiring circuit.













Step 3: Detach and remove the damaged lamp along with its terminal.

Step 4: Place the new lamp and the terminal at the right position.







Step 5: Place the lamp and the wiring connection accordingly. Care must be taken so that the wiring does not come into contact the heating elements.



Step 6: Reassemble the metallic plates at the frame of the toaster's body.







Step 7: Connect the appliance to the power supply.



Step 8: Dispose of the damaged component(s) at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

## 5. Filter Coffee Maker

### **5.1 General-Operation Principles**

The instant filter coffee maker is a widely popular appliance known for making coffee. The operation principles of the filter coffee maker are based on a heating element, that heats water that the user places inside the coffee maker (water tank). The hot water exits the water tank via a metallic circulation tube and enters a special valve. The water circulation tube contacts another tube that transfers heat to the water during its course to the valve. When the hot water reaches the valve via its circulation tube, it exits the valve and gravitationally enters a funnel, where the grounded coffee and the filter are placed. When the hot water contacts the grounded coffee in the funnel, a liquefied water-coffee mixture passes through the filter, that captures the grounded coffee particles, and gravitationally exits the funnel entering a carafe (glass carafe). Depending on the type of the coffee maker the carafe is either heated or seated















on a heating surface (by the same heating element that heats the water in the circulation tubes) in order to retain the coffee's temperature. The heating of the water and the coffee in the carafe is adjusted by a thermostat. The thermostat is connected to a lamp that indicates the user-owner that the coffee making is completed.

The required time of the heating process of the water that enters in the funnel and then passes through the filter is automated for any type a coffee maker appliance. The user's interference relates to the "on-off" switch, and the procurement and placement of the grounded coffee in the funnel with the filter and the water in the water tank. Although any type of coffee making appliance an "on-off" switch, some, provide the users options to meet other preferences of coffee making by utilizing different programming and functions (high- or low-density coffee etc.).

In order to meet the demands of this particular concise guide, a regular filter coffee maker that operates with a single heating function and a heated carafe was selected.



Image 5: Filter Coffee Maker











### 5.2 Indications of Malfunction-Possible Damages

Like the water boiler and the toaster, the filter coffee maker has a thermostat with functionality that relates to the heating of water and the heating of the heated base where the carafe is seated (if the carafe isn't already a heated one). The coffee maker's heating function is similar to the boiler's function with a slight difference. The heating element of the coffee maker doesn't only heat the water but also heats the circulation tube where the water travel towards the valve, the funnel and the coffee carafe. The maximum heating capacity of a single function coffee maker is set by a thermostat and usually does not exceed 115°C.

Compared to common damages that concern terminal connections and thermostats, the coffee maker has similar malfunction indications such as the ones of the water boiler and the toaster. In particular, like the water boiler, the coffee maker appliances do not have a removable "on-off" switch. Moreover, like the water boiler and the toaster, the coffee maker's thermostat contacts a metallic surface that is connected to a heating element, which by order, is connected to a tube that transfers the water to the valve towards the funnel and later to the coffee carafe. In contrast with the toaster, the replacement of the lamp of the coffee maker is not feasible, because it is located on the "on-off" switch which is connected to a micro-wired board. In order to replace such a component as this particular board you need to reach a professional certified technician that acquires the particular knowledge.

The most usual malfunctions indications of a filter coffee maker and the possible damages that may occur are cited below:

Malfunction		Possible Damage		
No	Indication	No	Possible Cause	
1	Incapability to Start (operation failure)	1	Failure of the terminal of the heating element	
		2	Failure of the terminal of the thermostat	
		3	Thermostat failure	

Table 5: Malfunction Indications & Possible Damages on a Filter Coffee Maker:

### 5.3 Repair Steps

For every single damage that is referred in Table 5 and relates to a coffee maker, a number of repair steps are mentioned. Every repair step is accompanied with infographic material (photos) in order to provide the user with an overview of the repair process.

The repair steps are provided according the ascending numerical order of the Table 5.





Before proceeding to any repair steps, it is essential to remove the appliance and unplug it from the power supply source. This is a necessary precaution measure that needs to be taken during the overall repair process.

Moreover, keep in mind that for any component replacement (i.e. terminal wires, on-off switch), the new component needs to be the same or equivalent to the old one meeting the manufacturer's standards (dimensions, functionality etc.). It is advised, before removing the old/damaged component, to take a photo of its connection to the appliance, in order to place the new part accordingly, in order to prevent any misplacement.

The advised personal protection and tools equipment in order to home-repair according the reference of Table 5 are:

- Protective safety gloves in order to protect the hands from edgy or sharp components elements and safety goggles.
- Face mask (prefer a reusable one) in order to protect the respiratory system preventing any dust or residues entering the body.
- Screwdriver
- Pincers or/and pliers/dart
- Voltmeter

The repair steps for the damages mentioned in Table 5 can be followed by the owner-user by using only common tools. If the owner-user does not want to home-repair the appliance, there's always the option of contacting a professional certified technician. Likewise, if a damage isn't cited in Table 5, or the repair steps do not seem to apply and/or the appliance still doesn't function, the owner-user may, again, contact a professional technician. Note that, it is always advised to reach a professional certified technician that specializes on repairing electrical equipment/appliances/apparatus.

### 5.3.1 Repairing Damage No 1

In order to repair damage No 1, the required equipment includes:

- Screwdriver
- Pincers or a pliers/dart
- Metallic terminal for the heating element's circuit with technical specifications similar to the damaged one.

Malfunction: Incapability to start, possibly caused by a failure of the terminal of the heating element.

Step 1: Disconnect the appliance from the power supply.













Step 2: Detach the plastic protective bottom case from the appliance's body to access the wiring connections of the heating element and the thermostat.



Step 3: Detach and remove the damaged terminal connection wiring between the wiring and the heating element.















Step 4: Connect the new metallic terminal between the heating element and the wiring.



Step 5: Place the wiring connection of the heating element accordingly. Be careful, the wiring must not contact the heating element.







Step 6: Reassemble the plastic protective bottom case on the appliance's body.



Step 7: Connect the appliance to the power supply.

Step 8: Dispose of the damaged component(s) at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

#### 5.3.2 Repairing Damage No2

In order to repair damage No 2, the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- Metallic terminal for the thermostat circuit of the same technical specifications as.

Malfunction: Operation failure, possibly caused by a failure of the metallic terminal of the thermostat.





EAAHNIKOT OPTANIEMOT A











Step 1: Disconnect the appliance from the power supply.

Step 2: Detach the plastic protective bottom case from the appliance's body in order to access the wiring circuit of the heating element and the thermostat.



Step 3: Detach and remove the damaged terminal between the wiring and the thermostat.



eu







Step 4: Connect the new terminal to the thermostat and the circuit.



Step 5: Place the wiring connection to the thermostat accordingly. Be careful the wiring must not contact the heating element.







Step 6: Reattach the plastic protective bottom case to the appliance's body.



Step 7: Connect the appliance to the power supply.

Step 8: Dispose of the damaged component(s) at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

#### 5.3.3 Repairing Damage No 3

In order to repair damage No 3, the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- Voltmeter, in order to run a diagnosis
- Thermostat terminal with dimensions and functionality equivalent with the damaged one

Malfunction: Operation failure, possibly caused by the failure of the thermostat's wiring connection.

Step 1: Disconnect the appliance from the power supply.




Step 2: Detach the plastic protective bottom case from the appliance's body in order to access the circuit wiring connection of the thermostat and the heating element.



Step 3: Apply the terminals of the voltmeter on the thermostat's terminal. If the voltmeter indicates that the wiring doesn't properly operate (electricity passage failure) and it's caused by a failure of the metallic terminal of the thermostat, see section 5.3.2. If the damage is caused by a failure of the terminal of the heating element, section 5.3.1. For any other possible damage causes reach out to professional certified technician.







### Step 4: Detach and remove the terminal of the thermostat.



Step 5: Detach and remove the damaged thermostat













Step 6: Place the new thermostat and connect the terminal to the circuit.



Step 7: Reassemble the wiring to the thermostat. Note that the wiring must not come into contact with the heating element.













Step 8: Reassemble the plastic protective bottom case to the appliance' body.



Step 9: Connect the appliance to the power supply

Step 10: Dispose of the damaged component(s) at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

### 6. Blow Dryer-Hair Dryer

### **6.1 General-Operation Principles**

The blow dryer (also known as "hair dryer") refers to an electrical appliance that is used to dry hair. Its operating principles are based on a combination of air flow through a radial flow fan and a heating element (electrical resistance) through which the suctioned air passes and exits the thermos. The fan's motor and its accessories (fan impeller, rotor) and the heating element are mounted in an arrangement inside a plastic protective case that ends up to a nozzle.

Specifically, at the rear part of the case a motor is installed, the axis of which is connected to an arrangement of an impeller/rotor. When the motor is operating the impeller inserts air from the rear end of the dryer and passes the air inside the case towards the front end where the air





exits the appliance. During the air's passage inside the case, the air meets the heating element (electrical resistance). Moreover, while the air is inserted in the dryer, it passes through a filter. The filter captures the particles. The air forced in the appliance contacts the resistance of the heating element (heating process) and exits the dryer through the front end of the appliance called the nozzle. At the same time, the cold air that enters the appliance contacts the resistance, the air warms up and the resistance, at the same time, cools down.

The heating element is located in the front section of the protective case of the appliance. It usually has a spiral form and is normally surrounded by a metallic liner. When the resistance of the heating element is heated, then electrical energy is converted to thermal energy. Furthermore, heat is transferred from the warmest mean to the coolest and as a result the air molecules that contact the heating element's resistance heat up.

The overall arrangement of this appliance is supplemented with a hand grip, which is part of the appliance' body, along with the protective case. Within the hand grip, a tablet is installed with an on-off circuit (an "on-off' switch"). The on-off circuit most of the times combines function options that relate to the air speed adjustments and an intensity control circuit of the heating element. In some models of hairdryers, there is an extra button through which an air ionization option is provided that inserts the appliance from the rear part of the appliance's protective case (hair protection).

In order to meet the requirement of this particular CRG, a small-sized fixed-speed common hand-grip dryer with an "on-off" switch, an air speed adjustment button of two speed options, an impeller, and, finally, a two-option heat intensity button was selected.



Image 6: Hair Dryer





### 6.2 Indications of Malfunction-Possible Damages

The hair dryer's operation combines the forced movement of the air (that is achieved via the rotating impeller-same as the operation of the fan) with the heating of a fluid via convection (such as the operation principle of the water boiler and coffeemaker). But, because of the heating element's arrangement inside the protective case of the appliance's body, any potential malfunction that relates to this particular part can't be repaired from the user-owner because its repairing procedure requires the total dissemblance of the appliance. The particular repair process requires a certified specialized technician in order to be done. Therefore, the most common damages/malfunction that can be repaired by the user-owner mainly relate to terminal wire connections and/or to the cleaning of the apparatus from dust accumulation.

The most common malfunction indications and possible damages that relate to a hair dryer are presented in the table below:

Malfunction		Possible Damage	
No	Indication	No	Possible Cause
1	Incapability to Start (operation failure)	1	Failure of the terminal of the 'on-off' switch
		2	Dust and Residues on the "on-off" switch
2	Incapacity of the heating element to produce heat	3	Dust and Residues on the heat intensity switch
3	Reduced Impeller's Velocity- Weird Noise/s	4	Dust and Residues on the impeller

### 6.3 Repair Steps

For every single damage that is referred in the above cited table (Table 6) and relates to a hair dryer, a number of repair steps are mentioned below. Every repair step is accompanied with infographic material (photos) in order to provide the user with an overview of the repair process.

The repair steps are provided according the ascending numerical order of Table 6.

Before proceeding to any repair steps, it is essential to remove the appliance and unplug it from the power supply. This is a necessary precaution measure that needs to be taken during the overall repair process.

Moreover, keep in mind that for any component replacement (i.e. terminal wires, on-off switch), the new component needs to be the same or equivalent to the old one meeting the manufacturer's standards (dimensions, functionality etc.). It is advised to take pictures of the appliance's assembly, before removing the old/damaged component, in order to prevent any malfunctions when placing the new part.





The advised personal protection and tool equipment in order to home-repair according the reference of Table 6 are:

- Protective safety gloves in order to protect the hands from edgy or sharp components elements and safety goggles.
- Face mask (prefer a reusable one) in order to protect the respiratory system preventing any dust or residues entering the body.
- Screwdriver
- Pincers or/and pliers/dart
- Portable Electric air hammer
- Lubricant oil

The repair steps for the damages mentioned in Table 6 can be followed by the owner-user by using only common tools. If the owner-user does not want to home-repair the appliance, there's always the option of contacting a professional certified technician. Likewise, if a damage isn't cited in Table 6, or the repair steps do not seem to apply and/or the appliance still doesn't function, the owner-user may, again, contact a professional technician. Note that, it is always advised to reach a professional certified technician that specializes on repairing electrical equipment/appliances/apparatus.

### 6.3.1. Repairing Damage No 1

In order to repair damage No 1, the following equipment is required:

- Screwdriver
- Pincers or pliers/dart

Malfunction: Operation failure, possibly caused by failure of the 'on-off' switch terminal.

STEP 1: Disconnect the appliance from the power supply.

STEP 2: Detach the plastic protective case covering the handle in order to have access to the power supply interface of the on-off switches provided for thermal load.













STEP 3: Remove the power supply socket (phase and neutral) from the terminal.



STEP 4: Create a winding in the bronze/copper shaft of each terminal wire connection (phase and neutral) and reposition it in the terminal, in the same position as before.









STEP 5: Assemble the plastic protective case that covers the handle.



STEP 6: Connect the appliance to the power supply.

### 6.3.2. Repairing Damage No 2

In order to repair damage No 2, the following equipment is required:

- Screwdrivers
- Portable Electric Air Compressor

Malfunction: Operation failure, possibly caused by dust and residues on the "on-off" switch.

STEP 1: Disconnect the appliance from the power supply.











STEP 2: Detach the plastic protective case covering the handle in order to have access to the power supply interface to the start-pause provided for thermal load.



STEP 3: Use portable electric pressure air/air compressor, in order to clean up a dust accumulation, the inside of the on-off switch. It is preferable for this procedure to take place outdoors or in a well-ventilated area due to the possible quantity of accumulated dust.











STEP 4: Assemble the plastic protective case covering the handle.



STEP 5: Connect the appliance to the power supply.

### 6.3.3. Repairing Damage No 3

In order to repair damage No 3, the following equipment is required:

- Screwdrivers
- Portable Electric Air Compressor

Malfunction: Incapacity of the heating element to produce heat, possibly caused by Dust and Residues on the heat intensity switch.

STEP 1: Disconnect the appliance from the power supply.











STEP 2: Detach the plastic protective case covering the handle in order to have access to the power supply interface of the on-off switches provided for thermal load.



STEP 3: Use portable electric air compressor, in order to clean up a dust accumulation, the inside of the heat load regulating switch. It is preferable for this procedure to take place outdoors or in a well-ventilated area due to the possible quantity of accumulated dust.













STEP 4: Assemble the plastic protective case covering the handle.



STEP 5: Connect the appliance to the power supply.

### 6.3.4. Repairing Damage No 4

In order to repair damage No 4, the following equipment is required:

- Screwdrivers
- Portable Electric Air Compressor
- Lubricating oil

Malfunction: Reduced Impeller's Velocity-Weird Noise/s, possibly caused by dust and residues on the impeller.

STEP 1: Disconnect the appliance from the power supply.













STEP 2: Detach the plastic protective case covering the handle in order to have access to the power supply interface to the on-off switches provided for thermal load.

















STEP 3: Remove the impeller from the engine rotational axis / motor shaft.



STEP 4: Use portable electric air compressor, in order to clean up the dust accumulation on the axis of the hair dryer impeller. It is preferable for this procedure to take place outdoors or in a well-ventilated area due to the possible quantity of accumulated dust.

STEP 5: Use portable electric pressure air/air compressor, in order to clean up a dust accumulation, the plastic cap-filter of the dryers shaft protective case. It is preferable for this procedure to take place outdoors or in a well-ventilated area due to the possible quantity of accumulated dust.













STEP 6: Apply manually micro-amount lubricant oil locally on the spin axis of the dryer impeller.



STEP 7: Replace the impeller on the motor shaft.

STEP 8: Assemble the rear external plastic cover-filter to the dryer's spindle protective case.



STEP 9: Connect the appliance to the power supply.





### 7. Vacuum Cleaner

### 7.1 General-Operation Principles

Vacuums cleaners are appliances that absorb pollutant particles and are used in every household to clean the floors or any other type of surface. Depending on their use, vacuum cleaners are distinguished in two categories: floor vacuum cleaners and handheld vacuum cleaners. Moreover, depending on the way they absorb and store the pollutant particles they are distinguished in to vacuum cleaners that contain a special bag container (dust bag) that stores the particles and in to vacuum cleaners that contain a specially formed space that stores the particles in their body (dust container-part of the appliance's body).

The vacuum cleaners that operate with a dust bag use the dust bag as a motor filter during the suction process. This type of vacuum cleaner operates with recurring costs, because the userowner needs to regularly change and replace the dust bag with an empty new one. On the other hand, vacuum cleaners that operate with a reusable dust container with no expendables, use the motor's filter to separate air from dust particles which is placed at the entrance of the dust container (air exhaust). Moreover, the previously referred filter needs to be removed and cleaned by the user-owner regularly (always depending on the use). Comparably to the vacuum cleaners that have expendable costs (dust bags), the vacuum cleaners without recurring costs are bigger in order to have enough space to store the particles, therefore, their purchase requires a larger investment. Furthermore, all the vacuum cleaner models that require a dust bag or not, contain an extra filter in the rear part of their body, where the depolluted air is being expelled during the vacuuming (air exhaust).

The basic operation principles of a vacuum cleaner concern a negative-pressure that is being created by a vacuum pump (vacuum blower) where during the appliance's operation, dust particles enter the vacuum cleaner through a tube from the cleaning surface. The dust particle suction occurs by the floor brush in to a metallic telescope tube which is connected to the appliance's body where the dust bag or the dust container are located. During the floor/surface cleaning the floor brush osculates with the cleaning surface. The vacuum blower creates a negative pressure in the dust container allowing dust particles to be contained within the dust bag or the dust container, and at the same time, the depolluted air is exhausted from the rear filter of the appliance. In addition, this is the reason why all types of negative pressure vacuum cleaners need 1.000 to 2.000 watt to operate. In the majority of vacuum cleaner models, the vacuum blower is placed in a specially designed part in the appliance next to the dust bag or the dust container and contains two filter arrangements. The first filter arrangement is placed on the outer walls of the vacuum blower near the area where the depolluted air exits the appliance's body.

The vacuum cleaner operates by the use of an "on-off" switch. Sometimes the switch is rotating and compiles a range of operation functions (varied suction power). The majority of the components of a vacuum cleaner that relate to the vacuum blower and its function along with





the filters are placed in the interior of the appliance's body protected by a protective case, most of the times a plastic one. Also, the rear part of the appliance's body has wheels that facilitate the appliance's movement during the vacuuming. Moreover, in several cases, alongside of the wheels a winding is placed to store the vacuum's power supply cord in the appliance's interior. Finally, in order to protect the vacuum blower from overheating that may occur by the blockage of the floor brush or the metallic telescope tube, there is a safety pressure valve with a spring and a small extrusion tube that are used to balance the negative pressure and the pressure of the external environment. In cases such as the blockage where the negative pressure in the dust bug/container exceeds a standard level, then, through the extrusion tube transmits an electrical signal and enables the safety mode. When the safety mode is enabled the safety pressure valve opens towards the external environment in order to balance the negative pressure in the dust bag/container.

There are several types of vacuum cleaner models in the market, lately, that combine a simultaneous water supply along with the vacuuming. The water, after it's heated, is dosimetrically sprayed on the cleaning surface by a circulation circuit from the floor brush that has a textile coating which facilitates the dust pollutants and other particles' absorption.

In order to meet the demands of this particular concise guide, a regular vacuum cleaner was chosen with an "o-off" switch that is rotating combining and providing the selection of different vacuuming power functions (vacuuming programs), a dust bag to store the absorbed dust particles and pollutants from the cleaning surface (i.e. a floor), and finally wheels that facilitate the appliance's movement.

### 7.2 Indications of Malfunction-Possible Damages

The operation of a vacuum cleaner is similar to the operation of the hair blower. Like the hair blower, the vacuum cleaner absorbs air from the external environment from where the floor brush osculates and exhausts it from the vacuum cleaner's rear area. Moreover, because the suction's scope is to absorb and store particles (dust, residues, etc.) in the dust bag or the dust container, and to simultaneously exhaust the depolluted air from the appliance towards the external environment creating negative pressure conditions larger than the hollow spindle of the blow dryer's protective case, the vacuum cleaners operate with a larger motor that uses a larger amount of power. Furthermore, the most common vacuum cleaners' damages concern the "on off" circuit wiring, the retractor function of the power supply cable, the blockage of floor brush, the metallic telescope tube's, the safety pressure valve's etc.; all the above, of course, because of the overuse of the appliance.

The most common malfunction indications of a vacuum cleaner and the possible damages are cited in the following table.













### Table 7: Indications of Malfunction & Possible Damages of a Vacuum Cleaner

Malfunction		Possible Damage	
No	Indication	No	Possible Cause
1	Incapability to Start (operation failure)	1	Failure of the terminal of the "on-off" switch circuit.
2	Cord Winding Function Failure	2	Disconnection of the terminal of the circuit with the winding
3	Reduced Efficiency of the Appliance	3	Dust and Residues on the upstream of the blower's the filter
		4	Dust and Residues on the downstream of the blower's filter
		5	Dust and Residue in the Extrusion Tube of the Safety Pressure Valve's Circuit



Image 7: Vacuum Cleaner





### 7.3 Repair Steps

For every single damage that is being referred in the above cited table (Table 7) and relate to a vacuum cleaner, a number of repair steps are mentioned. Every repair step is accompanied with infographic material (photos) in order to provide the user with an overview of the repair process.

The repair steps are provided according the ascending numerical order of the previous table (Table 7)

Before proceeding to any repair steps, it is essential to remove the appliance and unplug it from the power supply. This is a necessary precaution measure that needs to be taken during the overall repair process.

Moreover, have in mind that for any component replacement (i.e. terminal wires, lamps etc.), the new component needs to be the same or equivalent to the old one meeting the manufacturer's standards (dimensions, functionality etc.). It is advised, before removing the old/damaged component, to take a photo of its connection to the appliance, in order to place the new part accordingly, to prevent any misplacements.

The advised personal protection and tools equipment in order to home-repair according the reference of Table 7 are:

- Protective safety gloves in order to protect the hands from edgy or sharp components elements and safety goggles.
- Face mask (prefer a reusable one) in order to protect the respiratory system preventing any dust or residues entering the body.
- Screwdriver
- Pincers or/and pliers/dart
- Portable Electric air hammer

The repair steps for the damages mentioned in Table 7 can be followed by the owner-user by using only common tools. If the owner-user does not want to home-repair the appliance, there's always the option of contacting a professional certified technician. Likewise, if a damage isn't cited in Table 7, or the repair steps do not seem to apply and/or the appliance still doesn't function, the owner-user may, again, contact a professional technician. Note that, it is always advised to reach a professional certified technician that specializes on repairing electrical equipment/appliances/apparatus.

### 7.3.1. Repairing Damage No 1:

In order to repair damage No 1, the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- Metallic terminal for the "on-off" switch circuit of the same technical specifications as.

Malfunction: Incapability to start, possibly caused by a failure of the "on-off" switch terminal.











Step 1: Disconnect the appliance from the power supply.



Step 2: Detach the plastic protective case from the support frame of the appliance's body in order to access the button of the on-off switch, the circuit's tablet that facilitates power adjustment, the circuit of the safety pressure valve and the retractor circuit.













Step 3: Remove the "on-off" switch and the terminal of the according circuit from the plastic protective case of the support frame.







Step 4: Remove the damaged metallic terminal wiring from the metallic terminal of the "on-off" switch.



Step 5: Connect the new metallic terminal wiring, first with the tablet of the function's power adjustment, and then with the terminal wiring of the on-off switch.













Step 6: Place the on-off switch and the terminal of the according circuit in to the plastic protective case of the support frame.



Step 7: Reassemble support frame's the plastic protective case and all the remaining parts.











Step 8: Connect the appliance to the power supply.

Step 9: Dispose the damaged metallic wiring connection at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

### 7.3.2. Repairing Damage No 2:

In order to repair damage No 2, the following equipment is required:

- Screwdriver
- Pincers or pliers/dart
- Metallic Terminal of the Winding Function Circuit with dimensions and functionality similar to the damaged one

Malfunction: Cord Winding Failure, possibly caused by the Disconnection of the Terminal of the Circuit with the retractor

### Step 1: Disconnect the appliance from the power supply













Step 2: Detach the plastic protective case from the support frame of the appliance's body in order to access the button of the on-off switch circuit, the circuit's tablet that facilitates the power adjustment, the circuit of the safety pressure valve and the retractor's circuit.



Step 3: Remove the retractor circuit from the terminal of the retractor.











Step 4: Remove the damaged metallic terminal from the retractor circuit terminal.



Step 5: Connect the new metallic terminal wiring to the retractor circuit terminal accordingly.













Step 6: Connect the retractor circuit with retractor's terminal wiring circuit.



Step 7: Place the on-off switch and the terminal of the according circuit in to the plastic protective case of the support frame.







Step 8: Connect the appliance to the power supply.

Step 9: Dispose the damaged metallic wiring connection at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

### 7.3.3. Repairing Damage No 3:

In order to repair damage No 3 the following equipment is required:

- Portable Electric air hammer

Malfunction: Reduced Efficiency of the Appliance, possibly caused by the Dust and Residues on the upstream of the blower's the filter.

Step 1: Disconnect the appliance from the power supply.



Step 2: Remove the plastic protective case from the bottom of the appliance where accumulated dust and residues may have interrupted its operation





Step 3: Remove from the interior part the dust bag/container in order to access the filter.



Step 4: Remove the filter's frame from its place and detach the filter from the frame.















Step 5: Use the portable electric air hammer to remove any dust and residues from the filter. It is advised to proceed with this particular step outdoors or in a well-ventilated area.



EAAHNIKOT OF

rreus



Step 6: Reassemble the filter in its frame and place the filter accordingly.



Step 7: Place the dust bag/container in the interior of the plastic protective case accordingly.









Step 8: Close and secure the plastic protective case accordingly in to the appliance's bottom



Step 9: Connect the appliance to the power supply.

#### 7.3.4. Repairing Damage No 4

In order to repair damage No 4 the following equipment is required:

- Portable Electric air hammer

Malfunction: Reduced Efficiency of the Appliance, possibly caused by Dust and Residues on the downstream of the blower's filter















Step 1: Disconnect the appliance from the power supply.



Step 2: Remove the plastic protective frame from the bottom of the appliance where the air exhaust is, and access the filter.









Step 3: Use the portable electric air hammer to remove any dust and residues from the filter. It is advised to proceed with this particular step outdoors or in a well-ventilated area.













Step 4: Place the filter back in its frame.



Step 5: Connect the appliance to the power supply.

### 7.3.5. Repairing Damage No 5:

In order to repair damage no 5 the following equipment is required:

- Screwdriver
- Portable Electric air hammer

Malfunction: Reduced efficiency of the appliance, possibly caused by the Dust and Residue in the Extrusion Tube of the Safety Pressure Valve's Circuit












Step 1: Disconnect the appliance from the power supply.



Step 2: Detach the plastic protective case from the support frame of the appliance's body in order to access the on-off switch circuit, the circuit's tablet that facilitates the power adjustment, the circuit of the safety pressure valve and the retractor's circuit.















Step 3: Detach and remove the extrusion tube from the safety pressure valve's circuit tablet and from the entrance of the support of the plastic protective case of the appliance's body.











Step 4: Use the portable electric air hammer to remove any accumulated dust and residues from the extrusion tube It is advised to proceed with this particular step outdoors or in a well-ventilated area.



Step 5: Reconnect the extrusion tube to the safety pressure valve's circuit socket and to the input of the plastic protective case of the appliance's body.















Step 6: Reassemble the plastic protective case.



Step 7: Connect the appliance to the power supply.











### 8. Cordless phone

### 8.1 General-Operation Principles

The cordless phone, despite the fact that as an appliance is characterized as electronic equipment, is cited in this particular concise guide because of the malfunctions that occur exclusively to its accessories. In particular, the whole equipment of a cordless phone includes the charger (integrated wiring voltage adaptor), a wire that is used to transfer data to a UTP type connection port (USB wire and USB port), a charging unit, and the cordless phone.

Concerning its connectivity, the cordless phone is seated on the charging unit, connected to the integrated wiring voltage adaptor and the UTP type wire (USB). Accordingly, the charger's wiring terminal is connected to the power supply socket whereas the USB wire is connected to a UTP type port. Moreover, at the rear part of the cordless phone there is an extractable protective case where the batteries'/battery's case exists.

The charging procedure of a cordless phone occurs through a circuit between a connection two terminal wires that are placed in the bottom part of the cordless phone. When the cordless phone is seated on the charging unit the two terminals of the cordless phone touch the corresponding terminal of the charging unit. Accordingly, the charging unit's terminal wiring gets power from the wire that is connected to the power supply.

In order to meet the demands of this particular concise guide, a regular cordless phone with the above referred accessories and connectivity was chosen.

### 8.2 Malfunction Indications-Possible Damages

Considering that the cordless phone is an electronic device, it has circuit tablet with individual functions that regard the science of informatics. In cases where a malfunction indication occurs that relates to the electronic equipment, it is necessary to reach a certified technician to repair any damages. Therefore, within the framework of this particular concise guide, a demonstration of only the home-repairable damages and their repair steps are cited below. The repair steps that are demonstrated below do not require high demanding equipment. The referred damages relate either to the cordless phone's accessory equipment inexpediencies or to maintenance aspects of the cordless phone and/or the charging unit (i.e. cleaning of the terminal wiring etc.)

The most common malfunction indications of a cordless phone and the possible damages that may occur regarding a cordless phone are demonstrated in the table below (Table 8).













#### Table 8: Malfunction Indications & Possible Damages of a Cordless phone

3. Malfunction		4. Possible Damage	
5. No	6. Indication	7.	8. Possible Cause
		0	
9. 1	10. Incapability to Charge	11.	12. Charger's failure
		13.	14. Dust and Residue on the Charging
			Unit's Terminal
15. 2	16. Fast Discharging	17.	18. End of the batteries' life



Image 8: Cordless phone

#### 8.3 Repair Steps

For every single damage that is being referred in the above cited table (Table 8) and relate to a cordless phone, a number of repair steps are mentioned below. Every repair step is accompanied with infographic material (photos) in order to provide the user with an overview of the repair process.





The repair steps are provided according the ascending numerical order of the previous table (Table 8)

Before proceeding to any repair steps, it is essential to remove the appliance and unplug it from the power supply source. This is a necessary precaution measure that needs to be taken during the overall repair process.

Moreover, keep in mind that for any component replacement (i.e. charging unit, charger etc.), the new component needs to be the same or equivalent to the old one meeting the manufacturer's standards (dimensions, functionality etc.). It is advised to take pictures of the appliance's assembly, before removing the old/damaged component, in order to prevent any malfunctions when placing the new part.

The advised personal protection and tool equipment in order to home-repair according the reference of Table 8 are:

- Protective safety gloves in order to protect the hands from edgy or sharp components elements and safety goggles.
- Face mask (prefer a reusable one) in order to protect the respiratory system preventing any dust or residues entering the body.
- Portable Electric air hammer
- Voltmeter to run diagnostics

The repair steps for the damages mentioned in Table 8 can be followed by the owner-user by using only common tools. If the owner-user does not want to home-repair the appliance, there's always the option of contacting a professional certified technician. Likewise, if a damage isn't cited in Table 8, or the repair steps do not seem to apply and/or the appliance still doesn't function, the owner-user may, again, contact a professional technician. Note that, it is always advised to reach a professional certified technician that specializes on repairing electrical equipment/appliances/apparatus.

### 8.3.1. Repairing Damage No 1

In order to repair damage No 1, the required equipment includes:

- Voltmeter to run diagnostics
- A charger with dimensions, characteristics and functionalities equivalent to the damaged one.

Malfunction: Incapability to charge, possibly caused by charging unit's failure.

Step 1: Disconnect the charger's wire from the charging unit















Step 2: Connect the charger's plug to the power supply



Step 3: Apply the voltmeter's terminal to the terminal wire of the charger's plug (internal and external application). If the voltmeter's voltage indication is not the same as the nominative voltage of the charger (printed on a sticker attached to the rear bottom part of the charger), its replacements is necessary. On the contrary if the voltmeter indicates the same voltage as the nominative voltage of the charge, and the damage is caused by another cause related to the electronic equipment, it is necessary to reach a professional certified technician to assist the repair or to repair the damage.













Step 4: Obtain a new charger with the same characteristics and functionality as the damaged one (meeting manufacturer's standards is essential).

Step 5: Connect the charger's plug to the power supply and to the according terminal of the charging unit.



Step 6: Dispose the damaged charger at the WEEE Sorting Center (SC), or at a collection point of the APPLIANCES RECYCLING S.A.

#### 8.3.2. Repairing Damage No 2:

In order to repair damage No 2, the following equipment is required:

- Portable Electric air hammer

Malfunction: Incapability to charge, possibly caused by Dust and Residue on the Charging Unit's Terminal













Step 1: Disconnect the appliance from the power supply.



Step 2: Remove the cordless phone from the charging unit, in order to access the terminal electrical connection in the base of the charging unit.







Step 3: Use the portable electric air hammer to remove dust and residue from the terminal electrical connection in the base of the charging unit. Prefer proceeding with this particular step outdoors or in a well-ventilated area.

Step 4: Place the cordless phone in the charging unity, and make sure that the cordless phone's terminal (at the bottom part of the phone) touch accordingly the charging unit's terminals in order to ensure electricity's passage.













#### 8.3.3. Repairing Damage No 3

In order to repair damage No 3, the following equipment is required:

-Rechargeable Batteries that fit the battery case, equivalent to the old ones.

Malfunction: Fast Discharging, possibly caused by end of life batteries.

Step 1: Remove the cordless phone from the charging unit



Step 2: Remove the protective case from the rear bottom part of the cordless phone to access the batteries' case and the batteries.













Step 3: Remove the old batteries.

Step 4: Replace the old batteries with the new ones. Be aware and make sure that the new batteries are placed according to the polarity that is indicated on the batteries' case. (+ or -)













Step 5: Place and secure the protective case of the batteries' case that is placed at the rear bottom part of the cordless phone.



Step 6: Place the phone in the charging unit.

Step 7: Dispose the old batteries to a collection point of AFIS S.A. Dust and Residue on the Charging Unit's Terminal.







