

Ultimate Micromotor EM420 Instructions for Use



EN



Micromotor Control Unit for Dental Handpiece EM420 EL-M40BA

Instructions for use



Symbols

	Catalog number
	Serial number
	Manufacturer
	Authorized representative in European Community
	Manufacturing Date
	B type applied part
	Alternating current
	Keep dry
	Caution
	Consult instructions for use
	Do not dispose with domestic waste
	Water proof grade

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Chapter 1. Introduction

1.1 Operation of Principle

This subject device contains an electric motor controller that provides rotational motions to a handpiece used during dental procedures to cut a tooth. This product consists of a control unit (controller), a micromotor, an adapter and a foot switch.

1.2 Intended Use (Purpose of Use)

The device is intended to be used as a control unit of an electric micromotor for a dental handpiece used in the general dental applications.

1.3 Intended Operator

This product can be used by only a licensed dentist and those with completed dental curriculums.

1.4 Indications

The device is indicated for use as a control unit of an electric micromotor for a dental handpiece used in the general applications such as dental restoration, prophylaxis, cavity treatment, crown treatment including cutting a tooth, inlays, onlays, filling, polishing, and endodontic treatment.

1.5 Check Before Use

- 1) Read the instruction manual before use.
- 2) Ensure that the product is used only by licensed dentists/authorized clinicians.
- 3) Ensure that the product is used only for its intended purpose.

Chapter 2. Safety Information (Precautions and Warning)

2.1 Danger

- 1) This product shall be used only under the rated power. Power outside the rated power range shall not be applied.

2.2 Warning

- 1) Do not handle the power cord with a wet hand to prevent an electric shock.
- 2) Do not expose the device to water to prevent an electric shock.
- 3) Do not use the device in a place where inflammable materials are around or risk of explosion exist.
- 4) No part of the control unit shall be repaired by the user. Do not disassemble the device.
- 5) Place the device on a stable location. Do not drop the device to the ground or exert an external force that can damage the device.
- 6) Do not use a mobile phone or wireless RF communication device close by as such adjacent use may adversely influence this electrical device.
- 7) No tampering of the device shall be allowed.
- 8) Don't use the foot switch in a place where there may be presence of water, such as emergency room or an operating room.

2.3 Caution

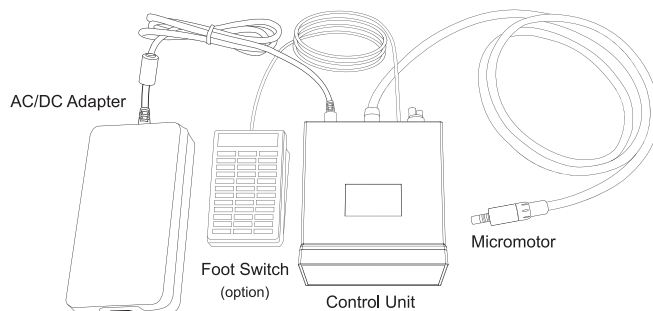
- 1) Do not make a connection of the device to a handpiece that does not meet the standard requirements.
- 2) If the motor runs abnormally compared to a condition observed under a normal use, stop using the device immediately and make a repair request to the supplier.
- 3) Check if the speed is set within the acceptable speed range prior to using the speed control button on the control panel.
- 4) Use only the adapter that is provided by the manufacturer.
- 5) Do not disassemble or tamper the micromotor or the control unit as it may damage the device.
- 6) If parts other than the designated specific parts are used as replacements, it may pose risks of raising electrical radiation or reducing product durability.

2.4 Notice

- 1) Read the User Manuals carefully to understand the function of each component prior to the use.
- 2) Use the device in accordance with the User Manuals instructions.
- 3) Pay a close attention to safety of the patient during the use of the while device.
- 4) Scrap and recycle the device and its parts in accordance with the applicable local laws and regulations.
- 5) For any issues relating to the use of the product including technical difficulties, please contract the supplier.

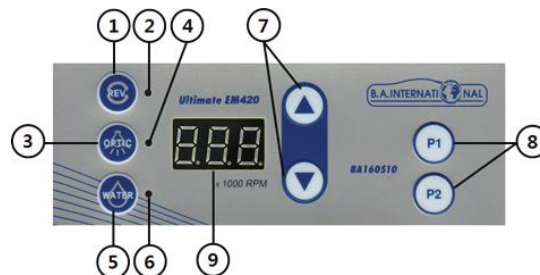
Chapter 3. Description

3.1 Description of System, Components and Functions



3.1.1 Control Unit

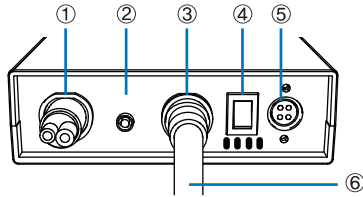
1) Front



No.	Name	Description
1	Button to select a rotational direction	Used to select a rotational direction (CW/CCW) of the micromotor.
2	Indicator for micromotor operation direction	Displays the direction of the micromotor.
3	Micromotor LED ON/OFF button	Used to turn on and off the motor running.
4	Micromotor LED indicator	Indicates whether micromotor LED is running (LED On signals LED is turned on).
5	Spray On/Off button	Used to switch on or off the spray function
6	Spray indicator	Displays the operational state of the spray function; water is sprayed when it is On.
7	Speed controller	Used to set the rotational speed and the maximum speed of the motor.
8	Memory program selection button	Used to save the program values set in the memory and select the saved program.
9	Speed indicator	Displays the rotational speed of the handpiece.

Control Unit

1) Rear



3.1.2 Micromotor (BA640572/ELM-B40S)



No.	Name	Description
1	Tubing Connector	Supplies air and water
2	Foot Switch Connector	Connects the control unit with the foot switch.
3	Motor Connector	Serves as a connection to run the micromotor (it cannot be separated from the control unit.)
4	Power Switch	Power switch of the control unit.
5	Adapter Connector	Through which power gets supplied from the adapter.
6	Motor Cable	Connects the control unit and motor.

No.	Name	Description
1	Handpiece connector	To which the handpiece is connected (ISO 3964).
2	Body	In which the electric energy is converted into the rotational power.
3	LED	LED installed in the motor.

3.2 Product Performance

1) Control Unit

Model	EM420 (EL-M40BA)
Input	100-240V~, 1.4-0.7A, 47-63Hz
Power Consumption	105 VA(Max.)
Dimension	133 × 113 × 35mm [Width × Length × Height]
Speed range	1,000 ~ 40,000 rpm
Spray on/off	o
Program memory	2
Class of protection	IPX0

2) Micromotor

Model	BA640572 (ELM-B40S)
Max. Speed	40,000 rpm
Dimension	Ø20 × L63mm
Weight	69g
Optic	White LED
Internal Irrigation	Yes
Cable length	2m

Product Performance

3) Foot Switch (option)

Model	BA160511 (FS-30)
Function	Motor On/Off
Class of protection	IPX1
Cable length	1.95m

4) AC/DC Adapter

Model	BA160512 (FSP105-KEAM1)
Input	100-240 VAC , 1.4-0.7A
Frequency	47-63Hz
Output	36-38 VDC, 2.92 A
Power	105 W
Dimension	76 × 146 × 40 mm [Width × Length × Height]

3.3 Additional Device Information.

3.3.1 Type of protections against electric shocks Class I equipment

3.3.2 Degree of protections against electric shocks Type B applied part : 

3.3.3 Mode of operation Continuous operation

3.3.4 Applied parts Handpiece: Used in connection with a micromotor ※ Handpiece is not supplied by the manufacturer.

3.4 Environmental Conditions (Storage, Relocation, Operation)

1) Storage conditions

Temperature : 0°C ~ +50°C

Humidity : 10 ~ 80%

Air pressure : 500hPa ~ 1060hPa

2) Relocation conditions

Temperature : 0°C ~ +50°C

Humidity : 10 ~ 80%

Air pressure : 500hPa ~ 1060hPa

3) Operation conditions

Temperature : +10°C ~ +35°C

Humidity : 30 ~ 80%

Air pressure : 700~1060 hPa



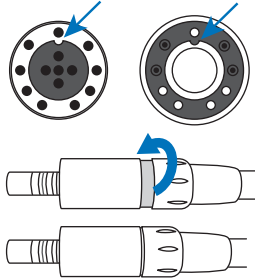
CAUTION

► Operation of the device in an environment other than those specified by manufacturer may lead to causing the device malfunction.

Chapter 4. Installation

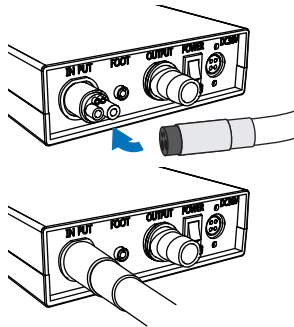
4.1 Connection the micromotor with a cable (Tubing).

- 1) Check if there is may damage to the cable or connection pins of the motor prior to making a cable connection to the motor.
- 2) Make a cable connect to the micromotor as illustrated below.



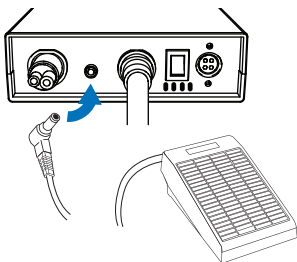
- ① Identify the holes of the connector cable cap and pins of the motor terminal for connection.
- ② Insert the pins of the connection terminal of the motor into the connector cable cap.
- ③ Turn the cap anticlockwise to secure the connection.

4.2 Handpiece Tubing Connector



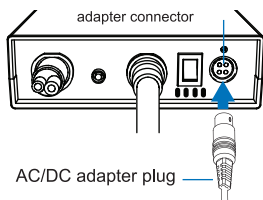
- ① Confirm that the tubing shape of the unit chair matches with the back terminal of the control unit for connection.
- ② Connect the tubing to the control unit and secure the connection to prevent the air or water leakage.

4.3 Connection of foot switch



- ① Visually check if any damaging condition appears on the foot switch terminal at the rear side of the control unit as well as the connection jack of the foot switch.
- ② Insert the connection jack of the foot switch into the foot switch terminal at the rear side of the control unit.

4.4 Connecting the AC/DC adapter



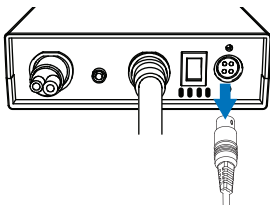
- ① Insert the AC/DC adapter plug into the adapter connector.

Be careful to fit into the groove upon connection.



Do not use an adapter other than the specified product.

4.5 Disconnection



The device can be disconnected in a reverse order of connection instructed herein.

Chapter 5. Operation

5.1 How to Operate the Product

5.1.1 Speed adjustment (Main function)



The speed can be set up to a maximum of 40,000 rpm (1:5 - 200,000 rpm, 1:1 - 40,000rpm, 16:1 - 2,500 rpm, 20:1 - 2,000 rpm) by pressing the speed control button on the control unit.

5.1.2 Setting a rotational direction



- ① The rotational direction of the micromotor can be set by pressing the rotational direction selection button on the control panel when the motor is not running.
- ②) When the light indicating a rotational direction gets turned off, the rotational direction is set back to the normal forwarding direction (clockwise);

5.1.3 Setting optic LED On/Off



The LED installed in the micromotor can be turned on or off by pressing the OPTIC button on the control panel. This function is available only for ELEC-LED model.

5.1.4 Setting water spray



The water spray function can be turned on or off by pressing the SPRAY button on the control unit.

5.1.5 Selection of the program mode



- ① Press and hold the button for selecting micromotor's operational direction and the LED on/off button simultaneously for 3 seconds or longer.
- ② Select the intended program mode by pressing the button for micromotor's operational direction.
 - ▶ EP(Electric pedal): set the speed button on the display panel to an intended speed and run the motor by pressing the foot switch.
 - ▶ HD(Hand control): run the motor by setting the speed button on the display panel to an intended speed.
 - ▶ PP(Press pedal): set the speed control knob on the display panel to an intended speed and run the motor by pressing the air pedal.



Electric Pedal
Mode



Hand Control
Mode



Press Pedal
Mode



- ③ Press and hold the Optic button for 3 seconds or longer to leave configuration setting.

5.1.6 Memory program



① How to save memory program: Customize settings of rotational direction, optic and so on; Press and hold one of the two program buttons P1 or P2 for 3 seconds or longer.



② How to retrieve pre-saved program: Select the saved program by pressing P1 or P2 button.

5.2 Cautions to be taken during use Operation

- ▶ During dental procedures/surgeries, continue close monitoring of patient's condition.
- ▶ When an abnormal condition is found through observing the patient or device used, take an appropriate measure including stopping the use of the device to ensure patient safety.
- ▶ Do not allow a patient to access the device.

Chapter 6. Maintenance

6.1 Manual cleaning

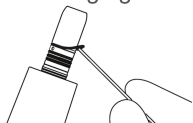
- 1) Disconnect the motor from the motor cable (tubing), which connects it to the control unit.
- 2) Prepare a piece of cloth (cotton) or a soft brush soaked with isopropyl alcohol.
- 3) Clean the surface of the motor with the cloth or soft brush covered with isopropyl alcohol for at least 3 minutes.
- 4) Repeat the aforementioned cleaning steps when foreign matters are found on the surface of the device.

6.2 Sterilization

Sterilization is not applicable for the use of the subject device.

※ For sterilization of handpieces, etc. follow sterilization instructions provided by the manufacturer of the handpiece..

6.3 Changing the O-ring



- 1) Replace the O-ring if water or air leaks occur at a connection between the micromotor and handpiece or when it is difficult to install the handpiece.
- 2) Remove the O-ring on the micromotor and put on a new O-ring with a designated tool.



NOTICE

Replace the O-ring if

- ▶ Water or air leaks occur, ▶ The handpiece vibrates abnormally, ▶ The supply of water or air cannot be stopped, or
- ▶ It is difficult to install or remove the handpiece. ※ There is no specific replacement period.
- ▶ If you want to purchase additional O-rings, contact the manufacturer.

Chapter 7. Troubleshooting

7.1 Instructions to Handle Error Messages

1) Types of Errors

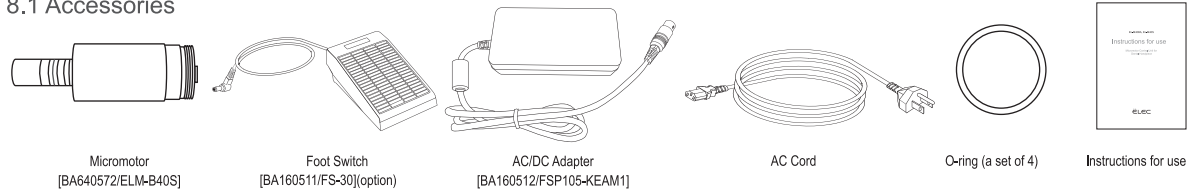
Error code	Status	Cause of error	Remedy
E1	Micromotor connection error.	Poor micromotor connection	Visually check the micromotor connection.
E2	Micromotor defect	Poor micromotor Connection or Micromotor damage	Replace the micromotor if the micromotor has no issues.
E3	Micromotor overload	Micromotor is being overloaded.	Stop running the motor and restart after cooling it down for 3 minutes or longer.

7.2 Descriptions of Malfunctions

Malfunction types	Cause of error	Remedy
When the micromotor is not running.	Poor connection with a power cable	Check the power connection.
	Poor connection with the connection cable	Check the connection condition with the cable.
	Display panel breakdown	Contact the manufacturer for a repair request.
	Controller breakdown	Contact the manufacturer for a repair request.
	Micromotor breakdown	Contact the manufacturer for a repair request.
When the micromotor speed can't be controlled.	Poor connection of the connection code	Check the connection condition.
	Display panel breakdown	Contact the manufacturer for a repair request.
When the micromotor rotational direction cannot be changed.	Poor connection of the connection code	Check the connection condition.
	Display panel breakdown	Contact the manufacturer for a repair request.
When the optic LED is not working.	Breakdown of LED inside the micromotor.	Contact the manufacturer for a repair request.

Chapter 8. A/S

8.1 Accessories



8.2 Information on After-Sale Service

- ▶ Distributor: B.A. International Ltd.
- ▶ Made in : Republic of Korea
- ▶ Address: Unit 9, Kingsthorpe Business Centre, Studland Road, Northampton, NN2 6NE, UK.
- ▶ Contact: +44 (0)1604 777700 info@bainternational.com www.bainternational.com

8.3 Warranty

- ▶ Warranty period of the product : 1 year
- ▶ Shelf life of components and replacement cycle
 - Micromotor and cable, Foot Switch : 1 year
 - Warranty does not cover damages incurred due to customer's own, misuse of the product and the normal wear and tear of micromotor bearing are not included.

Chapter 9. Electromagnetic Compatibility

9.1 Electromagnetic Emission

The product is suitable for use in an specific electromagnetic environment.


The customer and/or the user of the product should assure that it is used in an electromagnetic environment as described below.

Emission Test	Compliance	Electromagnetic Environment Guidance
RF-emission CISPR 11	Group 1	The product use RF energy only for its internal function. Therefore, its RF emissions are very low and not likely to cause any interference in nearby electronic equipment. The product is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purpose.
RF-emission CISPR 11	Class A	
Harmonic emissions IEC 6100-3-2	Class A	
Voltage fluctuations / flicker emissions IEC 61000-3-3	Complies	

9.2 Electromagnetic Immunity

The product is suitable for use in a specific electromagnetic environment.

The customer and/or the user of the product should assure that it is used in an electromagnetic environment as described below.

Emission Test	IEC 60601- Level	Compliance Level	Electromagnetic Environment Guidance
Electrostatic discharge(ESD) IEC61000-4-2	± 6kV contact ± 8kV air	± 6kV contact ± 8kV air	Floor should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %
Electrical fast transient/bursts IEC61000-4-4	± 6kV contact ± 8kV air	± 6kV contact ± 8kV air	Mains power quality should be that of a typical commercial and/or hospital environment
Surge IEC61000-4-5	± 6kV contact ± 8kV air	± 6kV contact ± 8kV air	Mains power quality should be that of a typical commercial and/or hospital environment
Voltage dips, short interruptions and voltage variations on power supply input lines IEC61000-4-11	<5% UT(>95% dip in UT) for 0.5 cycle 40% UT(60% dip in UT) for 5 cycles 70% UT(30% DIP IN UT) for 25 cycles <5% UT(>95% dip in UT) for 5 sec	<5% UT(>95% dip in UT) for 0.5 cycle 40% UT(60% dip in UT) for 5 cycles 70% UT(30% DIP IN UT) for 25 cycles <5% UT(>95% dip in UT) for 5 sec	Mains power quality should be that of a typical commercial and/or hospital environment. If the user of the product requires continued operation during power mains interruptions, it is recommended that the product be powered from an uninterruptible power supply or a batter
Power frequency(50/60 Hz) magnetic field IEC 61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the product, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance: $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ for 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ for 800 MHz to 2.5 GHz
Radiated RF IEC 61000-4-3	3V/m 80 MHz to 2.5 GHz	3 Vrms	for 800 MHz to 2.5 GHz where P is the maximum output power rating of the transmitter in Watt(W) according to the transmitter manufacturer and d is the re-commended separation distance in meters (m) Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey ^a , should be less than the compliance level ^b in each frequency range Interference may occur in the vicinity of equipment marked with the symbol described lateral. 

Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, people and animals.

^a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered, if the measured field strength in the location in which the product is used exceeds the applicable RF compliance level above, the product should be observed, additional measures may be necessary, such as reorienting or relocating the product.

^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

9.3 Recommended Separation Distances between portable and mobile HF- communications equipment and the product

The product is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled.

The customer or the user of the product can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the product – according on output power and frequency of the communications equipment – as recommended in the following table.

Rated maximum output power of transmitter in watts (W)	Separation distance according to the frequency of transmitter in meter (m)		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.01	0.38	0.38	0.73
0.1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note 1:

At 80 MHz and 800MHz, the higher frequency range applies.

Note 2:

These guidelines may not apply in all situations.

Electromagnetic propagation is affected by absorption and reflection from structures, objects, people and animals.

Chapter 10. Product disposal guideline

10.1 Disposal of Control Unit and Foot Switch and motor



- 1) Follow your country specific laws, directives, standards and guidelines for the disposal of used electrical devices.
- 2) Ensure that the parts are not contaminated on disposal.

10.2 Disposal of Control Unit and Foot Switch and motor

- All packaging materials have been selected considering environmental protection and product disposal and packaging materials can be recycled. Please send old/used packaging materials to the collection and reprocessing centers appropriate per local laws and regulations. This way, you will contribute to the recycling of raw materials and the avoidance of waste.



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