

Clinical Electric  
**OPERATION MANUAL**

**FORZA ELS**

**FORZA ELM**



Electric Micromotor  
Standard



Electric Micromotor  
Miniature

# FORZA ELS

 Autoclavable

## ■ Classification of equipment

- Type of protection against electric shock : Class II equipment : 
- Degree of protection against electric shock : Type B applied part : 
- Method of sterilization or disinfection recommended by the manufacture : See 7. STERILIZATION
- Degree of safety of application in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide : EQUIPMENT not suitable for use in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide.
- Mode of operation : Continuous operation

### Cautions for Handling and Operation

- Read this manual thoroughly before use and operate the device properly.
- These instructions will show you how to operate the product safely and prevent danger to you or others. They are classified by the degree and/or severity of danger. All contents relating to safety should be observed.

Classification of precaution	Degree and severity of danger or damage
 <b>Warning</b>	Explains an instruction where personal injury or physical damage may occur.
 <b>Caution</b>	Explains an instruction where minor to medium injury or physical damage may occur.
 <b>Notice</b>	Explains an instruction that should be observed for safety reasons.

### Warning

- Do not insert or remove power cord with wet hands, electric shock may occur.
- Be sure not to expose the unit to water. It may result in a short or electric shock.
- Do not use this device near combustibles, or in a place where explosion may occur.
- Do not disassemble, as no user serviceable parts inside control unit.
- Do not hit / drop the unit or handpiece. Place unit in a stable place.
- Use the fuse of specified rating. (T1.6A 250V (Ref No. FU100, FU101))

## ⚠ Caution

- Forza ELS system can be used with the hose connector that is manufactured in accordance with ISO 9168, type B or type C.
- Forza ELS system is to be used by qualified personnel for dental treatment only, and it is used in dental office only.
- Place the most priority on patient safety.
- Rotate before using to check for vibration, noise, or overheating. If any abnormalities occur, stop using immediately and contact Brasseler USA.
- Grasp cord by plug to remove from outlet. DO NOT pull or yank on the cord itself.
- Do not connect / disconnect the handpiece during operation.
- Verify that the Speed Control Switch is adjusted within the allowable speed before use.
- When you install Control Box or Motor, DO NOT bend or twist the tubing or the cord. No unnatural force is needed to do the installation.
- Never use the AC adapter for other than the control box of this product.
- Connect only 4-hole, 5-hole or 6-pin tubing.
- Air Requirements: dry, free from contamination and oil. Use a compressor with a dry air system. Install an air filter if necessary. Blow out the lines before installation.
- Do not Autoclave (or any other high temperature Sterilization) Control Box, AC Adapter, Motor Cord.
- If you are using corrosive or harsh solutions please clean the control box etc. immediately after use. Failure to quickly clean the control box etc. can result in damage to the equipment or color changes of the case.
- The system functions normally in the environment where the temperature is at 0-40°C (32-104°F), humidity at 10-85% RH, atmospheric pressure at 500-1060hPa, and no moisture condensation in the Control Unit. Use at outside of these limits may cause malfunction.

## ⚠ Notice

- During vibration, the motor and the motor cord may affect computer and LAN cable. Noise could be heard during operation near a radio receiver.
- Turn off the Power Switch after each use. If unit is to be stored for long periods of time, drain water from unit and hose.
- Responsibility for operating and maintaining Medical Devices belongs to the user.
- Store the system in the place where the temperature is at -10-60°C (14-140°F), humidity at 10-85%RH, atmospheric pressure at 500-1060 hPa, and the system is not subject to air with dust, sulfur, or salinity.
- When trouble is found, send to Brasseler USA.

## 1. Set-Up Diagram

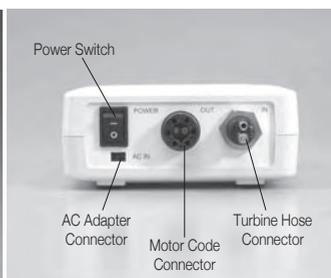
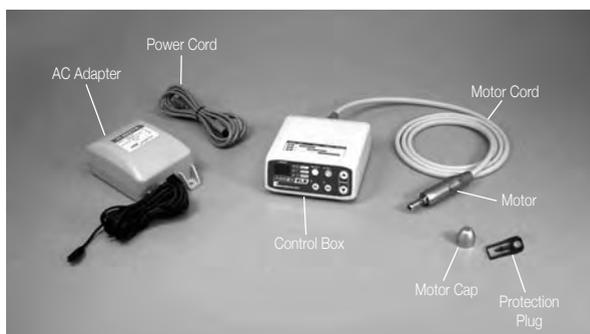


Fig. 1

## 2. Specifications

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### <Control Box>

Model	Forza ELSU
Rated Input	AC28V 50/60Hz
Drive Air Pressure	57psi (4bar) or less
Dimensions	W127 x D149 x H54 mm
Weight	517g

### <Motor>

Model	Forza ELS
Speed	2,000 - 40,000min <sup>-1</sup> (rpm)
Dimensions	Ø22.5× L81 mm
Weight	76g

### <AC Adapter>

Model	NE180
Rated Input	AC120V 50/60Hz 41VA
Output	AC28V 1.3A
Fuse	FU100 : T1.6A 250V FU101 : T1.6A 250V
Dimensions	W100 × D178 × H64 mm
Weight	1.4kg

### 3. Operating Control Box

#### ⚠ Caution

- Please be sure that there is no air or water coming from Turbine Hose when attaching to control box.
- Screw the Nut properly without unnatural force, when you plug into Turbine Hose Connector and Motor Cord Connector. Avoid cross threading

1) Connect the handpiece turbine tubing from the delivery unit you are using. Fit the turbine hose plug of the delivery unit to the turbine hose connector piping and tighten completely. (Fig. 2)

#### ⚠ Caution

- Connect only 4-hole, 5-hole or 6-pin tubing.
- Air Requirements: dry, free from contamination and oil. Use a compressor with a dry air system. Install an air filter if necessary. Blow out the lines before installation.

2) Connect the motor by aligning the motor cord plug and motor connector piping, and insert firmly. Tighten completely. (Fig. 3)

3) Connecting the AC adapter  
Insert the AC adapter plug into the AC adapter connector before plugging into wall outlet. (Fig. 4)

#### ⚠ Caution

Only use the AC adapter with control unit of this product.

4) Connecting the power cord  
Insert power cord into the inlet of AC Adapter. (Fig. 5)

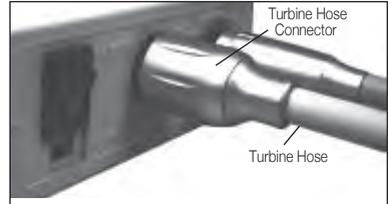


Fig.1



Fig.2



Fig.3



Fig.4

## 4. Handling the Motor

### ⚠ Caution

Ensure that the motor has completely stopped before handling the motor.

### (1) Connecting / disconnecting the motor and the motor cord

#### • Connecting

To connect, align and insert carefully and firmly the pins of the connector into the pin holes of the motor, and fasten the motor cord nut securely.

#### • Disconnecting

To disconnect the motor cord from the motor, unscrew and detach the motor cord nut, and gently pull out the motor cord connector.

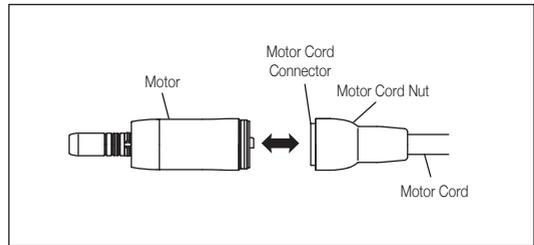


Fig. 6

### (1) Connecting / disconnecting the motor and the handpiece

#### • Connecting

Insert the E-type handpiece in the motor insert, and turn until it clicks and positioning mark are aligned.

#### • Disconnecting

Simply pull out the handpiece from the motor.

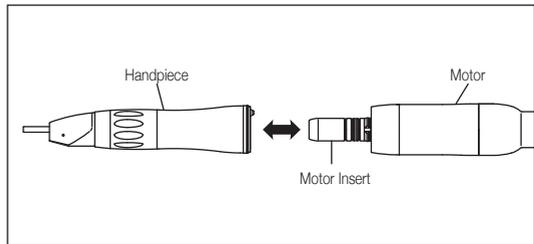


Fig. 7

### ⚠ Caution

Lubricated Handpiece should stand and allow oil to drain prior to autoclave cycle. Attach to the Motor after excess oil has been completely drained. If the oil enters the Motor, it may cause malfunction of the Motor

## 5. Operation Section

1) Insert the power cord plug into an outlet and turn the power switch on. When you turn on the power switch, lamps and speed indicator will light.

Power Switch Symbol Mark		
Function	OFF	ON

2) Before using this product, make sure to do the Foot Air Calibration function. (See 6. (1) Foot Air Calibration)

### Notice

Do this adjustment function after your purchase. Once it is adjusted, it will be memorized, and there is no need to do this everytime.

3) Push the handpiece selector to indicate the speed of the attachment you will use. (Fig. 8)

Handpiece Gear Ratio	Indicator	speed (min <sup>-1</sup> (rpm))
16:1	1~25	100~2,500
1:1	2~40	2,000~40,000
1:5	1~20	10,000~200,000



Fig. 8

4) Set the maximum speed using the speed control switches. (Fig. 9)



Fig. 9

5) Select FWD/REV rotation using the FWD/REV Select switch. (Fig. 10)



Fig. 10

6) The micromotor operation will be controlled by the air switch/foot pedal of the delivery unit.

## 6. Convenient Functions

### ■ Foot Air Calibration

By using this function, it enables you to use the maximum speed, 40,000 min<sup>-1</sup>(rpm), even though the air pressure of the delivery system is not high enough, by setting upper and lower limit of the air pressure.

#### ! Notice

Do this adjustment function after your purchase.

- 1) Press both  key and  key at the same time for more than 3 seconds.
- 2) With alarm sound, Speed Indicator will change to "**L 1**" (Lower air pressure limit setting mode).
- 3) By pressing the  key, Speed Indicator shows "**0.0**" and "**E b**" simultaneously.
- 4) By stepping the foot pedal of the delivery system, Speed Indicator shows the present air pressure.  
(Unit is kgf/cm<sup>2</sup>)

#### ! Notice

- The displayed air pressure is only a guideline. Please measure the correct air pressure with the air meter.
- The unit of displayed air pressure is "kgf/cm<sup>2</sup>". For other unit, please refer the bellow.  
ex) 0.1kgf/cm<sup>2</sup> = 1.422psi = 0.098bar    1.0kgf/cm<sup>2</sup> = 14.22psi = 0.98bar    3.0kgf/cm<sup>2</sup> = 42.67psi = 2.94bar

- 5) Using the foot pedal of the delivery system, maintain the air pressure between "**0.3**" - "**1.0**".

Press  key for more than 3 seconds to memorize the lower limit of the air pressure.

#### ! Notice

- Default value is set to "**0.5**" (kgf/cm<sup>2</sup>).
- When the air pressure is not between "**0.3**" - "**1.0**", it is displayed "**E b**", and will not be memorized.

- 6) After setting lower limit, press  key. Speed Indicator will change to "**L 2**" (Upper air pressure limit setting mode).
- 7) By pressing the  key, Speed Indicator shows "**0.0**" and "**E c**" simultaneously.
- 8) By stepping the foot pedal of the delivery system, Speed Indicator shows the present air pressure.  
(Unit is kgf/cm<sup>2</sup>)

#### ! Notice

- The displayed air pressure is only a guideline. Please measure the correct air pressure with the air meter.
- The unit of displayed air pressure is "kgf/cm<sup>2</sup>". For other unit, please refer to the  NOTICE described in ④.

- 9) Using the foot pedal of the delivery system, maintain the air pressure between "**2.0**" - "**4.0**".

Press  key for more than 3 seconds to memorize the upper limit of the air pressure.

#### ! Notice

- Default value is set to "**3.0**" (kgf/cm<sup>2</sup>).
- When the air pressure is not between "**2.0**" - "**4.0**", it is displayed "**E c**", and will not be memorized.

10) Press both **M2** key and **▲** key at the same time for more than 3 seconds, once again. When the alarm sounds, the setting is complete. By setting Speed Indicator by pressing **▲** key to "40", and now it is ready to use at the maximum speed, 40,000 min-1(rpm).

### ■ Light Brightness Adjusting function

Brightness of the Fiber Optic can be adjusted using this function.

- 1) Press both **M2** key and **▲** key at the same time for more than 3 seconds.
- 2) With alarm sound, Speed Indicator will change to "L I". By pressing **SELECT** key, change the Speed Indicator to "L 3"  
(Light Brightness adjusting mode). Press **REV** key to proceed.
- 3) When Speed Indicator changed to "3.5"(Default value), press **▲**, **▼** and adjust the brightness.

#### ⚠ Notice

- Default value is set to "3.5" (V).
- Adjustable between "1.6" - "3.6".

- 4) Press **M2** key for more than 2 seconds to set the brightness.
- 5) Press both **M2** key and **▲** key at the same time for more than 3 seconds, once again. When the alarm sounds, the setting is complete.

### ■ Program Function

It is possible to memorize settings (Speed, Gear Ratio, Forward/Reverse Direction).

- 1) Set the values for Speed, Gear Ratio, Forward/Reverse Direction.
- 2) Press **M1** key or **M2** key for more than 2 second. When the alarm sounds, the setting is complete.
- 3) You can use your settings (Speed, Gear Ratio, Forward/Reverse) by pressing **M1**, **M2** Key.

## 7. Sterilization

### Sterilize the motor only.

For the sterilization method, we recommend the steam autoclave sterilization method.

Sterilization is required first time you use and after each patient as noted below.

### ■ Autoclaving

- 1) Turn off the Power
  - 2) Detach the motor from the Motor Cord. (Refer to4. (1)  
Connecting / disconnecting the Motor and the Motor Cord)
  - 3) Clean the surface of the motor with brush etc. (Do not use the metal brush).  
and wipe it with the cotton moistened with disinfecting alcohol.
  - 4) Screw the Motor Cap to the Motor. Put the protection plug to the motor insert. (Fig. 10)
  - 5) Insert into an autoclave pouch. Seal the pouch.
  - 6) Autoclavable up to max. 135°C. (275°F) ex.) Autoclave for 20 min. at 121°C (250°F), or 15 min. at 132°C (270°F).
  - 7) Keep the Motor in the autoclave pouch to keep it clean until you use it.
- \* Sterilization at 121°C (250°F) for more than 15 minutes is recommended by EN13060 or EN ISO17665-1.

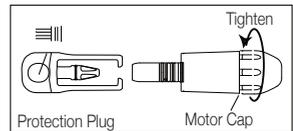


Fig.10

#### ⚠ Caution

- Do not Autoclave (or any other high temperature Sterilization) Control Box, AC Adapter, Motor Cord.
- Do not lubricate the motor.
- Do not wipe nor immerse the system in acidic water or acidic solutions.
- Do not sterilize with dirt on the surface. It might cause rust.
- Do not use Protection Plug without the mounting O-Ring. It may cause a malfunction. If O-Ring had damaged, replace it immediately. \*O-Ring (Protection Plug): Order Code 0312457102
- You can hang Protection Plug on the anywhere to prevent loosing it.
- Do not hung the Protection Plug with motor. It may drop the motor and cause damage.

## ■ Autoclave Procedure

- 1) Turn off the power.
- 2) Detach the motor from the motor cord. (See 2. Connecting / disconnecting the motor cord)
- 3) Clean the surface of the motor with brush etc. (Do not use the metal brush), and wipe it with the cotton moistened with disinfecting alcohol.
- 4) Screw the Motor Cap to the Motor. (Fig. 11) Put the Autoclave plug to the motor insert. (Fig. 12)
- 5) Insert into an autoclave pouch. Seal the pouch.
- 6) Autoclavable up to a max. 135°C (275°F).  
ex.) Autoclave for 20 min. at 121°C (250°F),  
or 15 min. at 132°C (270°F).
- 6) Keep the handpiece in the autoclave pouch to keep it clean until you use it.

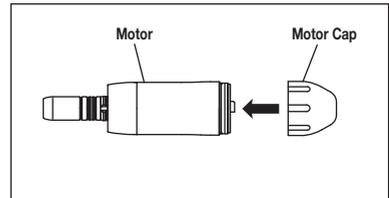


Fig. 11

### ! Caution

- Do not lubricate the motor.
- In case the sterilizer chamber temperature could exceed 135°C(275°F) during the dry cycle, skip the dry cycle.
- Always place the handpiece in the center or upper shelf of the chamber, as the local temperature at the bottom of chamber could rise beyond the set value.
- Do not wipe with, or clean or immerse in, high acid water or sterilizing solutions.

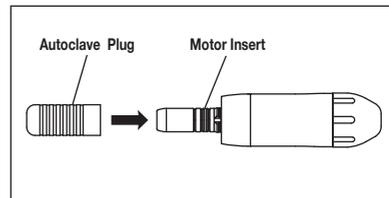


Fig. 12

## 8. Maintenance

### ■ How to replace the O-rings at the insert.

- 1) Remove the worn O-rings with a pointed tool like a needle.
- 2) Insert new O-rings the O-ring grooves.

\*Optional O-ring (Blue) : Order No. 5011004 UO

Optional O-ring : Order No. 5011005 UO

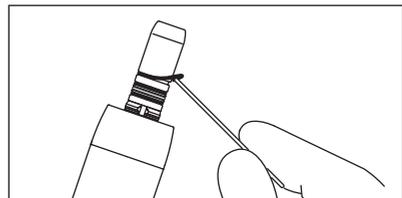
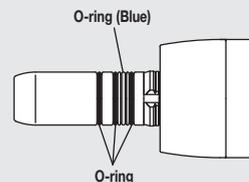


Fig. 13

### ! Caution

O-rings are total 4 pieces. Recognize a blue one; it is thinner than other 3 pieces. Refer to Fig. and make sure the order.



## ■ Replacing Bulb

- 1) Loosen Motor Housing and detach from the motor, and remove the old light bulb using the small pin, like a screw driver. (Fig. 14)
- 2) Align and insert the connector of the new bulb into the socket hole securely. Screw the motor housing securely to the motor.

\*Optional Bulb :TA Bulb (Pack of 3)  
Order No. Y900-132

### ⚠ Caution

- Make sure to turn off the power.
- Do not touch the glass section of new bulb.

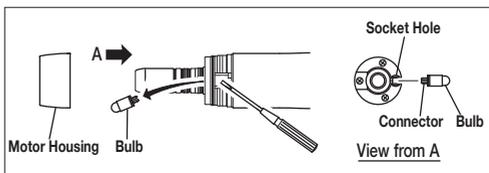


Fig. 14

## 9. Error Code

If the motor stops due to an abnormality such as a malfunction, overload, breakage or wrong use, it automatically checks the state of the control unit and detects the cause of the abnormality and displays an error code on the Speed Indicator. If an error code is displayed, turn on the power again and check whether the same error code is displayed. If the same error code is displayed, take action by referring to the instructions provided in the "Check/Remedy" column in the following table.

Error Code	Trouble	Cause	Check/Remedy
E0	Overcurrent error: (In circuit)	Detected overcurrent in the circuit.	Contact Brasseler USA.
E1	Overcurrent error: (In software)	Detected overcurrent in the software.	Contact Brasseler USA.
E2	Retry Error	Motor stopped by the overload, and not able to restart.	Contact Brasseler USA.
E3	ITRIP Error	Faulty Motor or Internal circuit.	Contact Brasseler USA.
E5	Overvoltage Input Error	Overvoltage is given to the Control Box.	Contact Brasseler USA.
E6	Bulb voltage Error	Overvoltage is given (more than 3.7V) from the Internal circuit.	Contact Brasseler USA.
E8	Overheat Error	High temperature safe system is functioning, due to long-time use at a high load.	Allow unit to cool, then try again
E9	Motor Start Error	<ul style="list-style-type: none"> <li>• Motor didn't reach the preset speed in a prescribed period of time.</li> <li>• Break down of a motor cord wire, or internal circuit malfunction.</li> </ul>	Contact Brasseler USA.
EA	Bulb voltage Error	Voltage for the Bulb didn't reach the preset speed in a prescribed period of time.	Contact Brasseler USA.
Eb	Air Offset Error	Lower than preset "Lower limit of the air pressure."	Displayed by Foot Air Calibration function. Not a malfunction.
Ec	Air Full Scale Error	<ul style="list-style-type: none"> <li>• Higher than preset "Upper limit of the air pressure".</li> <li>• Air pressure higher than 57psi (4bar) is given.</li> </ul>	Displayed by Foot Air Calibration function. Not a malfunction.
Ee	EEPROM Error	Malfunction of the memory for the setting values.	Contact Brasseler USA.

## 10. Troubleshooting

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If the motor stops due to an abnormality such as a malfunction, overload, breakage or wrong use, it automatically checks the state of the control unit and detects the cause of the abnormality and displays an error code on the Speed Indicator. If an error code is displayed, turn on the power again and check whether the same error code is displayed. If the same error code is displayed, take action by referring to the instructions provided in the "Check/Remedy" column in the following table.

Check/Remedy	Cause	Solution
Pilot Lamp does not light.	Power Switch is OFF.	Turn ON the switch.
	AC Adapter is not connected correctly.	Check the connection.
	Internal Fuse is blown, due to some reason.	Contact Brasseler USA
Motor does not run.	Tubing, Motor Cord, AC Adapter is not connected correctly.	Check the connection.
	Air pressure is not given, or not proper from the delivery unit.	Check the air pressure of the delivery system.
	Check the ERROR CODE in the Speed Indicator.	See 9. ERROR CODE
The rotation speed does not rise.	Air pressure is not given, or not proper from the delivery unit.	Check the air pressure of the delivery system.
	Air pressure of the delivery unit is lower than the "Lower limit of the air pressure".	Do "6. (1) Foot Air Calibration".
It beeps when turning on the switch.	You are stepping on the foot pedal when turning on the power switch. (Safety function)	Do not step the foot pedal, and turn on the power switch.
Light Bulb does not light.	Light Bulb is not connected correctly.	Insert the Light Bulb correctly and firmly. (See 8. (2) Replacing Bulb)
	Light Bulb is burnt-out, because of the life.	Please replace the Bulb. (See 8. (2) Replacing Bulb)
Motor heats up abnormally during rotation.	Coolant air is not given, or not proper from the delivery unit.	Check the air pressure of the delivery system.
Water leakage.	Tubing, Motor Cord is not connected correctly.	Check the connection.
	If it is from Control Box, something is wrong within the Control Box.	Contact Brasseler USA.
When turned on, the setting values are different from what used to be when turned off.	Turned off the motor while rotating.	Turn off after the Motor has stopped.

## 11. Warranty

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Brasseler USA warrants the handpiece against defects in manufacturing, workmanship and materials. Brasseler USA reserves the right to analyze and determine the cause of any problem. Warranty is voided should the handpiece not be used in accordance with this manual. Bulb etc. are expendable components, and are not covered by this warranty.

## 12. Disposing Product

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Please consult with Brasseler USA about waste disposal.

# FORZA ELM

 Autoclavable

## ■ Classification of Equipment

Type of protection against electric shock :

- Class II equipment : 

Degree of protection against electric shock :

- Type B applied part : 

Method of sterilization or disinfection recommended by the manufacture :

- See 7. STERILIZATION

Degree of safety of application in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide: EQUIPMENT not suitable for use in the presence of a flammable anaesthetic mixture with air or with oxygen or nitrous oxide.

Mode of operation :

- Continuous operation

## Cautions for Handling and Operation

- Read these safety cautions thoroughly before use and operate the product properly.
- These instructions will show you how to operate the product safely and prevent danger to you or others. They are classified by the degree and/or severity of danger. All contents relating to safety should be observed.

Classification	Degree and severity of danger or damage
 <b>WARNING</b>	Provides an instruction where personal injury or physical damage may occur.
 <b>CAUTION</b>	Provides an instruction where minor to medium injury or physical damage may occur.
 <b>NOTICE</b>	Provides an instruction that should be observed for safety reasons.

## Warning

- TO PREVENT ELECTRIC SHOCK Do not unplug the power cord with wet hands.
- TO PREVENT ELECTRIC SHOCK Be sure to prevent water on the Control Box.
- TO PREVENT ELECTRIC SHOCK Do not unplug the power cord roughly.
- TO PREVENT ELECTRIC SHOCK Use an electrical outlet that is grounded.
- If you feel any abnormality such as vibration, heat generation, abnormal noise, etc., prior or during use of the unit, stop using it immediately.
- Use the fuse of specified rating. [AC120V: T1.6A 250V (Ref No.FU100, FU101), AC230V: T800mA 250V (Ref No. FU100, FU101)]

## **Caution**

- When operating this system always consider the safety of the patient.
- The product is designed only for clinical use by qualified personnel.
- Every connection must be firmly connected.
- Do not allow any impact on the Product. Do not drop the Product.
- This system can be used with ISO 9168, type B or type C type hose connector.
- The system functions normally in the environment where the temperature is at 0-40°C (32-104°F), humidity at 10-85% RH, atmospheric pressure at 700-1060hPa, and no moisture condensation in the Control Unit. Operating outside of these limits may cause malfunction.
- When you install Control Box or Motor, DO NOT bend or twist the tubing or the cord. No unnatural force is needed for the installation.
- Do not use contaminated air (by dust or moisture). If the air contains water or dust, it might cause a malfunction or overheat.
- Do not connect the Forza ELM micromotor to the Forza ELS. It may prevent the LED light from working.

## **Unit**

- Grasp cord by plug to remove from outlet. DO NOT pull or yank on the cord itself. It may cause a wire disconnection or malfunction.
- Care should be taken not to place the AC Cord near a gas burner. Never attempt to repair a burned motor cord. Always replace it with a new cord.
- Prior to use, always check for vibration, noise and overheat. If any abnormalities are detected, stop using immediately and contact Brasseler USA.
- Be careful not to spill water onto the Unit as this may result in fire or an electric shock due to a short-circuit.

## **Motor, Handpiece (Option)**

- Do not use this product under heavy load for long time. It can cause the product to overheat.
- Do not connect or disconnect the cord until the drive motor has completely stopped.
- Do not connect / disconnect the handpiece during operation.
- Verify that the Speed Control Switch is adjusted within the allowable speed before use.
- Connect only 4-hole, 5-hole or 6-pin tubing.
- Air Requirements: dry, free from contamination and oil. Use a compressor with a dry air system. Install an air filter if necessary. Blow out the lines before installation.
- Do not Autoclave (or any other high temperature Sterilization) Control Box, AC Adapter, Motor Cord.
- The operator is responsible for correct operational control, maintenance and inspection.

## **Notice**

- During rotation, the motor and the motor cord may affect computer and LAN cable. Noise could be heard during operation near a radio receiver.
- After treatment, immediately turn off the power switch and shut off the air supply. Remove the power cord if the unit box is not to be used for a long time.
- Responsibility for operating and maintaining Medical Devices belongs to the user.
- Store the system in the place where the temperature is at -10-60°C (14-140°F), humidity at 10-85%RH, atmospheric pressure at 500-1060 hPa, and the system is not subject to air with dust, sulfur, or salinity.

# 1. Specifications

## Control Box

Model	Forza ELMU
Rated input	AC28V 50/60 Hz
Drive Air Pressure	0.4MPa (4.0kgf/cm <sup>2</sup> )
Dimensions	W127 x D149 x H54 mm

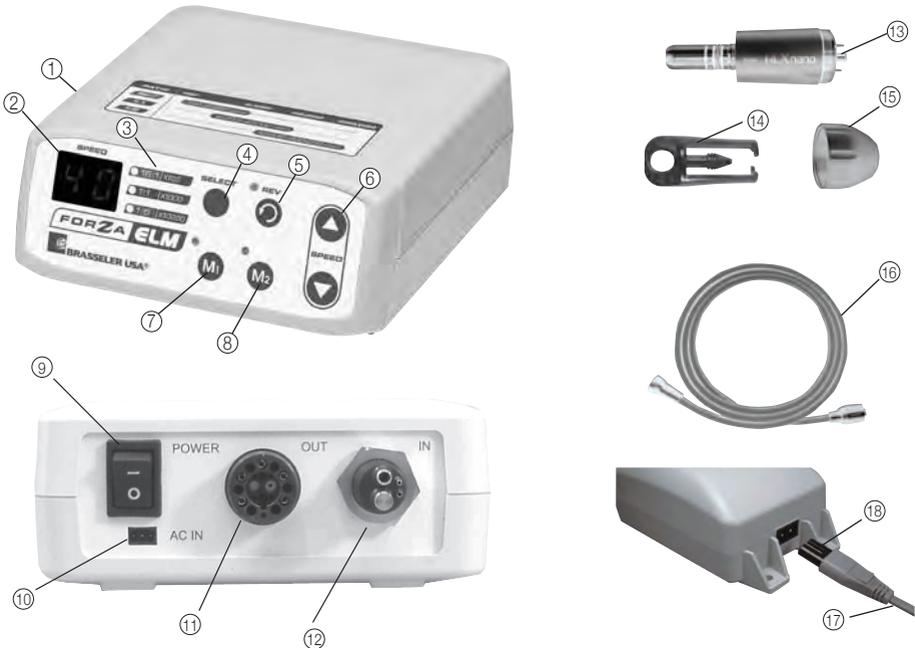
## Motor

Model	Forza ELM
Rotation Speed	2,000 - 40,000 min <sup>-1</sup>
Dimensions	DØ22 x H70 mm

## AC Adaptor

Model	AC Adaptor (NE180)
Rated input	AC120V 50/60Hz 41VA AC230V 50/60Hz 41VA
Output	AC28V 1.3A
Fuse	AC120V TR5-T C1 250V 19372 T1.6A AC230V TR5-T C1 250V 800mA
Dimensions	W100 x D178 x H64 mm

# 2. Component Names



- ① Control Box
- ② Speed Indicator
- ③ Gear Ratio Lamp
- ④ Gear Ratio Select Key
- ⑤ FWD/REV Select Key
- ⑥ Rotation Speed Adjustment Key
- ⑦ M1 Key
- ⑧ M2 Key
- ⑨ Power Switch

- ⑩ AC Adapter Connector
- ⑪ Motor Cord Connector
- ⑫ Turbine Hose Connector
- ⑬ Motor
- ⑭ Protection Plug
- ⑮ Motor Cap
- ⑯ Motor Cord (Unshielded 2.2m)
- ⑰ AC Cord (Unshielded 2.0m)
- ⑱ AC Adaptor (Unshielded cord 5.0m)

### 3. Operating Control Box

#### ⚠ Caution

- Be sure that there is no air or water coming from Turbine Hose when connecting to control box.
- Hand tighten the Nut properly without unnatural force, when you plug into Turbine Hose Connector and Motor Cord Connector.

#### (1) Connect the handpiece tubing from the delivery unit you are using.

Fit the Turbine Hose Plug of the delivery unit to the Turbine Hose Connector and tighten completely. (Fig. 1)

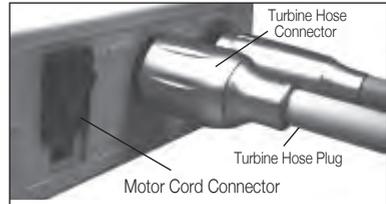


Fig.1

#### ⚠ Caution

- Do not use wet or contaminated air.
- Install an air filter if necessary. Blow out the lines before installation.

#### (2) Connecting the Motor

Connect the motor by aligning the Motor Cord Plug and insert firmly. Tighten it completely. (Fig. 2)

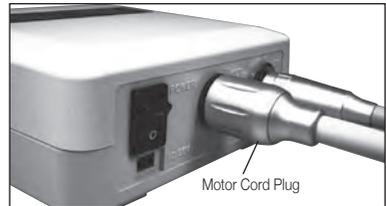


Fig.2

#### (3) Connecting the AC Adapter

Insert the AC adapter plug into the AC adapter connector before plugging into wall outlet. (Fig. 3)



Fig.3

#### ⚠ Caution

Only use the AC adapter with control unit of this product.

#### (4) Connecting the Power Cord

Insert the Power Cord into the Inlet of AC Adapter. (Fig. 4)

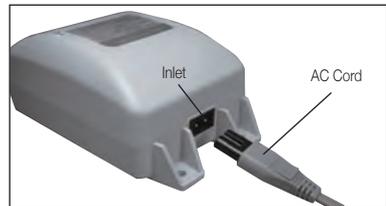


Fig.4

## 4. Handling the Motor

(1) Connecting / disconnecting the motor and the motor cord  
Align and insert firmly the Motor Pin into the pin holes of the Motor Cord Connector, and fasten the Motor Cord Nut securely. (Fig. 5)

To remove the Motor Cord from the Motor, unscrew and detach the motor cord nut, and gently pull out the motor cord connector.

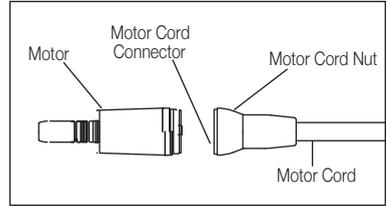


Fig.5

(2) Connecting / disconnecting the motor and the handpiece

To insert the E-type handpiece on the Motor Insert, align handpiece and motor, then turn those until its click. (Positioning pins are aligned)

To remove the handpiece, simply pull out the handpiece from the motor.

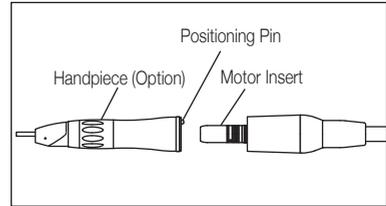


Fig.6

★Handpiece (not included in Forza ELM set.)

### ! Caution

- Care should be taken when using any handpiece attachment which requires lubrication. Following lubrication, stand the handpiece attachment vertically until the excess solution drains. Wipe the handpiece then attach it to the Micromotor.
- Do not connect or disconnect the handpiece until the motor has completely stopped.

## 5. Operation Section

(1) Insert the power Cord Plug in AC outlet and turn the Power Switch on. When you turn on the Power Switch, lamps and speed indicator will come on.

Power Switch Symbol Mark	○	I
Function	OFF	ON

(2) Before using this system, make sure to use the Foot Air Calibration function.  
(See 6. (1) Foot Air Calibration)

(3) Push the Gear Ratio Select Key to indicate the speed of the attachment you will use. (Fig. 7)

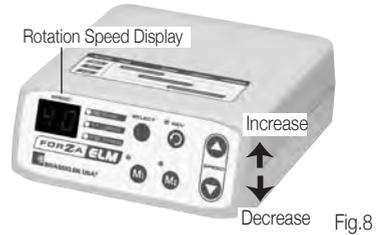
★During Speed Setting, Indicator display "Speed".  
For detail display, check table below.

Handpiece Gear Ratio	Indicator	Speed (min <sup>-1</sup> (rpm))
16:1	1 - 25	100 - 2,500
1:1	2 - 40	2,000 - 40,000
1:5	1 - 20	10,000 - 200,000



Fig.7

(4) Set the maximum speed using the Rotation Speed Adjustment Key (▲▼). (Fig.8)



(5) Select FWD/REV rotation using the FWD/REV Select Key. (Fig. 9)  
Lamp ON → REV  
Lamp OFF → FWD

(6) The micromotor operation will be controlled by the air switch/Foot Pedal of the delivery unit.



## 6. Convenient Functions

### (1) Foot Air Calibration

By using this function, it enables you to use the maximum speed, 40,000 min<sup>-1</sup>(rpm), even though the air pressure of the delivery system is not high enough, by setting upper and lower limit of the air pressure.

#### Notice

Do this adjustment function after your purchase. Once it is adjusted, it will be memorized, and there is no need to do this everytime.

- 1) Press M2 key and Rotation Speed Adjustment Key (▲▼) at the same time for more than 3 seconds.
- 2) When alarm sounds, Speed Indicator will change to "C1" (Lower air pressure limit setting mode).
- 3) By pressing the FWD/REV Rotation key, Speed Indicator shows "0.0" and "Eb" simultaneously.
- 4) By stepping the Foot Pedal of the delivery unit, Speed Indicator shows the present air pressure. (Unit is kgf/cm<sup>2</sup>)

#### Notice

- The displayed air pressure is only a guideline. Measure the correct air pressure with the air gauge.
- The unit of displayed air pressure is "kgf/cm<sup>2</sup>". For other unit, refer to the below.

ex) 0.1kgf/cm<sup>2</sup> = 0.01MPa

1.0kgf/cm<sup>2</sup> = 0.1MPa

3.0kgf/cm<sup>2</sup> = 0.3MPa

- 5) Using the Foot Pedal of the delivery unit, maintain the air pressure between "0.3" - "1.0". Press M2 key for more than 3 seconds to memorize the lower limit of the air pressure.

## Notice

- Default value is set to "0.5" (kgf/cm<sup>2</sup>)
- When the air pressure is not between "0.3" - "1.0", it is displayed "Eb", and will not be memorized

- 6) After setting lower limit, press Gear Ratio Select Key. Speed Indicator will change to "C2" (Upper air pressure limit setting mode).
- 7) By pressing the FWD/REV Rotation Key, Speed Indicator shows " 0.0" and "Ec" simultaneously.
- 8) By stepping the Foot Pedal of the delivery system, Speed Indicator shows the current air pressure. (Unit is kgf/cm<sup>2</sup>)
  - The displayed air pressure is only a guideline. Measure the correct air pressure with the air meter.
  - The unit of displayed air pressure is "kgf/cm<sup>2</sup>" For other unit, refer to the NOTICE described in 4).
- 9) Using the Foot Pedal of the delivery system, maintain the air pressure between "2.0" - "4.0". Press M2 key until it beep (more than 3 seconds) to memorize the upper limit of the air pressure.

## Notice

- Default value is set to "3.0" (kgf/cm<sup>2</sup>)
- When the air pressure is not between "2.0" - "4.0", it is displayed "Ec", and will not be memorized

- 10) Press both M2 key and Speed Adjustment Key () at the same time until it beep (more than 3 seconds), once again. When the alarm sounds, this setting is completed. By setting Speed Indicator by pressing Rotation Speed Key to "40", and now it is ready to use at the maximum speed, 40,000 min<sup>-1</sup> (rpm).
- (2) Light Brightness Adjusting Function  
Brightness of the Fiber Optic can be adjusted from this function.
- 1) Press M2 Key and Speed Adjustment Key () at the same time until it beep (more than 3 seconds).
  - 2) When the alarm sounds, Speed Indicator will change to "C1". Pressing the Gear Ratio Select key can change the Speed Indicator and Gear Ratio Lamp (C1→C2→C3→C1.....) Set indicator in C3 (Light Brightness adjustment mode) Press FWD/REV Rotation Key to proceed.
  - 3) When Speed Indicator changed to "3.5" ( Default value), press Speed Adjustment Key () and adjust the brightness.

## Notice

- Default value is set to "3.5" (V).
- Adjustable between "1.6" - "3.6".

- 4) Press M2 key until it beep (more than 3 seconds) to set the brightness.
- 5) Press M2 key and Speed Adjustment Key () at the same time for more than 3 seconds, once again. When the alarm sounds, this setting has completed.

### (3) Memory Function

It is possible to memorize settings (Speed, Gear Ratio, Forward/Reverse Direction)  
After the setting, you can use your settings by pressing M1, M2 Key.

- 1) Set the values for Speed, Gear Ratio, Forward/Reverse Direction.
- 2) Press M1 Key or M2 Key until it beep (more than 3 seconds). The alarm indicates the setting is complete.

## 7. Sterilization

### Sterilize the motor only.

For the sterilization method, we recommend the steam autoclave sterilization method.

Sterilization is required first time you use and after each patient as noted below.

#### ■ Autoclaving

- 1) Turn off the Power
  - 2) Detach the motor from the Motor Cord. (Refer to 4. (1) Connecting / disconnecting the Motor and the Motor Cord)
  - 3) Clean the surface of the motor with brush etc. (Do not use the metal brush). and wipe it with the cotton moistened with disinfecting alcohol.
  - 4) Screw the Motor Cap to the Motor. Put the Protection plug to the motor insert. (Fig. 10)
  - 5) Insert into an autoclave pouch. Seal the pouch.
  - 6) Autoclavable up to max. 135°C (275°F).  
ex.) Autoclave for 20 min. at 121°C (250°F), or 15 min. at 132°C (270°F).
  - 7) Keep the Motor in the autoclave pouch to keep it clean until you use it.
- \* Sterilization at 121°C (250°F) for more than 15 minutes is recommended by EN13060 or EN ISO17665-1.

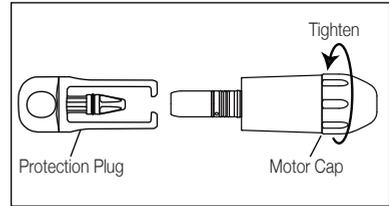


Fig.10

### ⚠ Caution

- Do not Autoclave (or any other high temperature Sterilization) Control Box, AC Adapter, Motor Cord.
  - Do not lubricate the motor.
  - Do not wipe nor immerse the system in acidic water or acidic solutions.
  - Do not sterilize with dirt on the surface. It might cause rust.
  - Do not use Protection Plug without the mounting O-Ring. It may cause a malfunction. If O-Ring had damaged, replace it immediately.
- \*O-Ring (Protection Plug): Order Code 0312457102
- You can hang Protection Plug on the anywhere to prevent losing it.
  - Do not hung the Protection Plug with motor. It may drop the motor and cause damage.

## 8. Maintenance

Replace the O-Ring if it becomes worn and makes it difficult to connect the handpiece or if the air or water leak.

### (1) Changing the O-Ring

Remove the O-Ring at the Motor Insert with a pointed tool, and mount the new O-Rings into the groove.

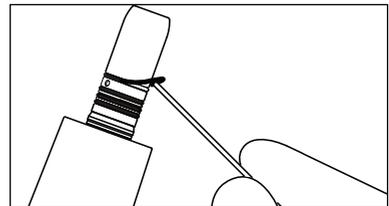
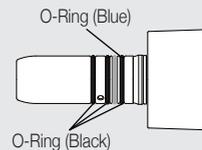


Fig.11

### ⚠ Caution

There are 4 O-Rings on the Motor Insert. Blue one is thinner than other 3 pieces. Make sure to order it.



## **Caution**

It might happen if the O-Ring becomes depleted.

- Air/Water leak
- Air/Water does not come off
- Vibration
- Difficult to connect/disconnect the handpiece

## 9. Error Code

If the motor stops due to an abnormality such as a malfunction, overload, break or incorrect usage, it automatically checks the state of the Control Box and detects the cause of the abnormality and displays an error code on the Speed Indicator. If an error code is displayed, turn on the power again and check whether the same error code is displayed. If the same error code is displayed, take action by referring to the instructions provided in the "Check/Remedy" column in the following table.

Error Code	Trouble	Cause	Check/Remedy
E0	Overcurrent error. (In circuit)	Detected overcurrent in the circuit.	Contact Brasseler USA.
E1	Overcurrent error. (In software)	Detected overcurrent in the software.	Contact Brasseler USA.
E2	Retry Error	Motor stopped by the overload, and not able to restart.	Contact Brasseler USA.
E3	ITRIP Error	Faulty Motor or Internal circuit.	Contact Brasseler USA.
E5	Overvoltage Input Error	Overvoltage is given to the Control Box.	Contact Brasseler USA.
E6	LED voltage Error	Overvoltage is given (more than 3.7V) from the Internal circuit.	Contact Brasseler USA.
E8	Overheat Error	High temperature safe system is functioning, due to long-time use at a high load.	Allow unit to cool, and try again.
E9	Motor Start Error	- Motor didn't reach the preset speed in a prescribed period of time. - Break down of a motor cord wire, or internal circuit malfunction.	Contact Brasseler USA.
EA	LED voltage Error	Voltage for the LED didn't reach the preset speed in a prescribed period of time.	Contact Brasseler USA.
Eb	Air Offset Error	Lower than preset "Lower limit of the air pressure"	Displayed by Foot Air Calibration function. Not a malfunction.
Ec	Air Full Scale Error	- Higher than preset "Upper limit of the air pressure". - Air pressure higher than 0.4MPa (4.0kgf/cm <sup>2</sup> ) is given	Displayed by Foot Air Calibration function. Not a malfunction.
EE	EEPROM Error	Malfunction of the memory for the setting values.	Contact Brasseler USA.

## 10. Troubleshooting

When trouble is found, check the following again before contacting Brasseler USA. If none of these is applicable or the trouble is not remedied even after action has been taken, a failure of this product is suspected.

Check/Remedy	Cause	Solution
Pilot Lamp does not light.	Power Switch is OFF.	Turn ON the switch.
	AC Adapter is not connected correctly.	Check the connection.
	Internal Fuse is blown, due to some reason.	Contact Brasseler USA.
Motor does not run	Tubing, Motor Cord, AC Adapter is not connected correctly.	Check the connection.
	Air pressure is not given, or not proper from the delivery unit.	Check the air pressure of the delivery system.
	Check the ERROR CODE in the Speed Indicator.	Refer to 9. ERROR CODE.
The rotation speed does not rise.	Air pressure is not given, or not proper from the delivery unit.	Check the air pressure of the delivery system.
	Air pressure of the delivery unit is lower than the "Lower limit of the air pressure".	Do "6. (1) Foot Air Calibration".
It beeps when turn on the switch.	You are stepping on the Foot Pedal when turning on the power switch. (Safety function)	Do not step the Foot Pedal, and turn on the power switch.
LED does not light.	Reached the end of life expectancy.	Contact Brasseler USA.
Motor heats up abnormally during rotation.	Coolant air is not given, or not proper from the delivery unit.	Check the air pressure of the delivery system.
Water leakage	Tubing, Motor Cord is not connected correctly.	Contact Brasseler USA.
	If it is from Control Box, something is wrong within the Control Box.	Check the connection.
When turned on, the setting values are different from what used to be when turned off.	Turn off the Motor while rotating.	Turn off after the Motor has stopped.

## 11. Warranty

Brasseler USA warrants the handpiece against defects in manufacturing, workmanship and materials. Brasseler USA reserves the right to analyze and determine the cause of any problem. Warranty is voided should the handpiece not be used in accordance with this manual.

## 12. Disposing of Product

Consult with Brasseler USA about waste disposal.

## Symbols



TUV Rhineland of North America is a Nationally Recognized Testing Laboratory (NRTL) in the United States and is accredited by the Standards Council of Canada to certify electro-medical products with Canadian National Standards.



Follow the waste of electric and electronic equipment (WEEE) Directive (2002/96/EC) to dispose of the product and accessories.



Consult operation instructions.



Manufacturer.



Class II Equipment.



This conforms to CE European Directive of "Medical equipment directive 93/42/EEC."



Type B applied part.



Autoclavable up to Max.135°C. \*for detail see Sterilization.



Marking on the outside of Equipment or Equipment parts that include RF transmitters or that apply RF electromagnetic energy for diagnosis or treatment.

Guidance and manufacturer's declaration - electromagnetic emissions		
The Forza ELM is intended for use in the electromagnetic environment specified below. The customer or the user of the Forza ELM and manual should assure that it is used in such an environment.		
Emissions test	Emissions test	Electromagnetic environment - guidance
RF emissions CISPR11	Group 1	The Forza ELM uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR11	class B	The Forza ELM is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC61000-3-2	class A	(*)This applies to the AC230V system. For AC120V system, this is "Not applicable".
Voltage Fluctuations/flicker emissions IEC61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity			
The Forza ELM is intended for use in the electromagnetic environment specified below. The customer or the user of the Forza ELM and manual should assure that it is used in such an environment.			
Immunity test	IEC60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC61000-4-2	±6kV contact ±8kV air	±6kV contact ±8kV air	Floors 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/burst IEC61000-4-4	±2kV for power supply lines ±1kV for input/output	±2kV for power supply lines No input/output line	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC61000-4-5	±1kV line(s) to line(s) ±2kV line(s) to earth	±1kV line to line ±2kV lines to earth	Mains power quality should be that of a typical commercial 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	<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 or hospital environment. If the user of the Forza ELM requires continued operation during power mains interruptions, it is recommended that the Forza ELM be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: Ut is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic immunity			
The Forza ELM is intended for use in the electromagnetic environment specified below. The customer or the user of the Forza ELM and manual should assure that it is used in such an environment.			
Immunity test	IEC60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC61000-4-6	3Vrms 150 kHz to 80MHz	3Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the Forza ELM, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80MHz to 800MHz $d = 2.3\sqrt{P}$ 800MHz to 2.5GHz Where $\sqrt{P}$ is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).  Field strengths from fixed RF transmitters as determined by an electromagnetic site survey <sup>1</sup> should be less than the compliance level in each frequency range <sup>2</sup> . Interference may occur in the vicinity of equipment marked with the following symbol: 
Radiated RF IEC61000-4-3	3V/m 80MHz to 2.5 GHz	3V/m	
NOTE 1 At 80MHz 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 and people.			
a) Field Strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobiles, 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 Forza ELM is used exceeds the applicable RF compliance level above, the Forza ELM should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Forza ELM.			
b) Over the frequency range 150kHz to 80MHz, field strengths should be less than 3V/m.			

Recommended separation distances between portable and mobile RF communications equipment and the nano400			
The Forza ELM is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Forza ELM can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter		
	150kHz to 80MHz $d=1.2\sqrt{P}$	80MHz to 800MHz $d=1.2\sqrt{P}$	800MHz to 2.5GHz $d=2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
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 800 MHz, the separation distance for 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 and people.			

\*Specifications may be changed without notice.

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