COXO®

CE 0197

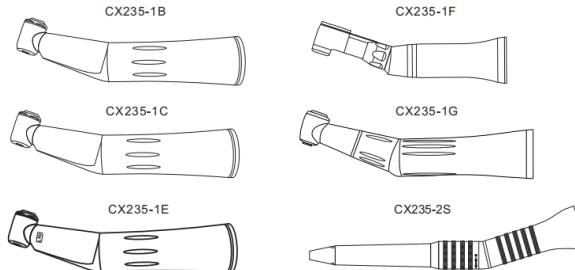
GEARED ANGLE HANDPIECE

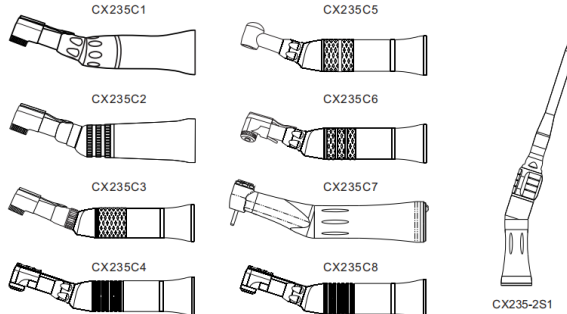
Operation Manual

CX235-1B CX235-1C CX235-1E
CX235-1F CX235-1G
CX235C1 CX235C2 CX235C3
CX235C4 CX235C5 CX235C6
CX235C7 CX235C8
CX235-2S CX235-2S1

Please read this operation Manual carefully and file for future reference.

Product Description




CX235C1
CX235C5
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CX235C7
CX235C4
CX235C8
CX235-2S1

⚠ WARNING

- Please read this operation manual carefully before use and file for future reference .
- When operating the product always consider the safety of the patient
- Check for vibration , noise and overheating outside the patient's oral cavity before use. If any abnormalities are found , stop using the handpiece immediately and contact dealer .
- User are responsible for the operational control , maintenance and continual inspection of this product.
- Do not attempt to disassemble the handpiece or tamper with mechanism.
- Do not connect or disconnect the handpiece or bur until the drive motor has completely stopped.
- Operators and all others in the area must wear eye protection and a mask when operating this handpiece.
- Depressing the push button while the handpiece is in operation may cause overheating serious technical damage and possible premature handpiece failure. During operation avoid contact with any oral tissue that may cause the push button to be depressed while the handpiece is in operation.

- Do not use high acid water or sterilizing solution to wipe , immerse or clean the product
- The products are delivered in a non-sterile condition and must be sterilized prior to use.
- Always keep the bur / drill shank clean . Debris in the chuck mechanism can prevent burs from seating properly and cause them to fly out during use.
- Perform regular function and maintenance checks.
- If the product is not used for a long period check it is functioning correctly before using on a patient.
- To avoid clinical downtime it is recommended that a spare be kept on hand in case of a breakdown during surgery.
- 20 : 1 handpiece always operate with water spray failure to do so may result in overheating.
- Do not start the 1 : 5 handpiece without the bur installed , it will cause the head overheating or damage to the cartridge.
- Do not operate the handpiece without the bur / drill.
- Do not connect or disconnect the handpiece until the motor has completely stopped.
- Do not connect or disconnect the handpiece until the motor has completely stopped.
- Do not immerse handpiece in any chemical solvents or solution or by dry-heat disinfection . Sterilization by autoclave at (134 C & 0 . 22MPa) is suggested.

Contraindications

1.Hmophilia patients should be used with caution.
2.The patient or doctor with a pacemaker is careful to use an electric motor to drive the handpiece.
3.Heart disease patients , pregnant women and children should be used with caution.

1. User and Intended Use

User : Qualified Professionals
Indication For Use: This medical device is intended for transmitting rotation of the power source at the direct drive ratio or at a different gear ratio , thereby running the instrument such as a bur or a reamer to cut and polish natural or artificial teeth during dental treatment.

2. Technical Date

Type	CX235-1C	CX235-1B	CX235-3E	CX235-1G	CX235C7	CX235-1F	CX235C1	CX235C2	CX235C3	CX235C4	CX235C5	CX235C8	CX235C6	CX235-2S	CX235-2S1
Gear Ratio	1:1	1:1	1:1	1:1	1:5	1:1	1:1	1:1	4:1	16:1	10:1	64:1	20:1	1:1	1:1
Speed	<40000 rpm	<40000 rpm	<40000 rpm	<40000 rpm	<200000 rpm	<40000 rpm	<40000 rpm	<40000 rpm	<10000 rpm	<25000 rpm	<40000 rpm	<6250 rpm	<2000 rpm	<40000 rpm	<40000 rpm
Spray Type	Inner spray	Inner spray	Inner spray	Inner spray	Inner spray	-	-	-	-	-	-	-	External spray	External spray	External spray
Bulb	Glass rod optic	-	LED	-	Glass rod optic	-	-	-	-	-	-	-	-	-	-
Water cooling	>50 ml/min at 200 kPa					-						-	>50 ml/min at 200 kPa		
Air cooling	>1.5L/min at 200 kPa					-								>1.5L/min at 200 kPa	
Coupling dimensions	Comply with ISO 3964														
Bur Type	ISO 1797-1 , type 1 , diameter2 35mm , shaft cmalping length : Minimal11mm , overall length : max23mm , blade diameter : max 2mm ISO 1797-1 , type 2 , diameter 2 . 35mm , shaft cmalping length : Minimal33mm , overall length : max50mm , blade diameter : max 2mm ISO 1797-1 , type 3 , diameter1 . 6mm , shaft cmalping length : Minimal11mm , overall length : max23mm , blade diameter : max 2mm														

Note: The maximum temperature of the handpiece does not exceed 60℃

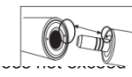
3. Connecting / Disconnecting Hand piece and Motor

3.1 Connecting

1)Insert the handpiece direct into the motor(Fig.1).

2)Align the handpiece and motor alignment pin(Fig. 2).

3)Confirm that the handpiece is securely connected to the motor.



Caution

- Glass rod optical handpiece pin , alignment the motor groove.
- Do not connect or disconnected the handpiece until the motor has completely stopped。
- No more than 10 minutes of contact with the patient.
- Our product can only be used in conjunction with equipment that complies with IEC 60601-1.

3.2 Disconnecting

Hold the motor and the handpiece , and pull it out (Fig 3).

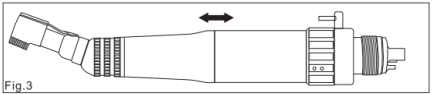


Fig.3

4.Mounting/Removing the bur

⚠ Caution

- ●Use only good condition cut shank in line with standard grinding bur.
- ●When the collect seitch is open or the bur is not inserted , dont start the motor .
- ●After the bur / drill is locked in place , lig htly pull out the bur / drill to make sure the bur / drill is locked.
- ●If the bur / drill does not install firmly , it may fly away or it does not remove.

4.1 For FG burs (Ø 1.6)

⚠ Caution

●Do not start the 1 : 5 handpiece without the bur installed , it will cause the head overheating or damage to the cartridge .

1) Insert the bur until it is correctly seated in place.

2) Depress the push button and insert the bur into the chuck until it is secure then release the button.

3) Ensure that the bur is secure by gently pulling and pushing the bur without depressing the push button.

4) To remove the bur , depress the push button firmly and remove the bur (Fig 4).

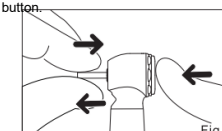


Fig.4

4.2 For CA burs and Engine File (Ø 2.35)

4.2.1 Push Button

1) Insert the bur until it is correctly seated in place.

2) Depress the push button and insert the bur into the chuck until it is secure then release the button.

3) Ensure that the bur is secure by gently pulling and pushing the bur without depressing the push button.

4) To remove the bur , depress the push button and remove the bur (Fig . 5).

4.2.2 Latch Chuck

1) Open the latch chuck to the right , insert the bur / drill.

2) Be sure the bur or drill the proper part in the cartridge then turn the latch chuck back.

3) When remove the bur , open the latch chuck then take out the bur.

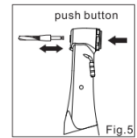


Fig.5

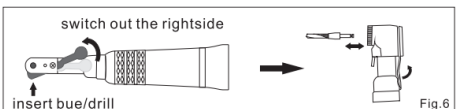


Fig.6

Fig.7

4.2.3 Saw Blade

1) Insert the handle of the saw blade at the cartridge position of the shaft center until it reach the bottom.

2) Remove the saw blade : will be dedicated to the head of the conical needle at the center of the hard part of the press , remove the saw blade (Fig . 7).

4.3 For Hand File

1) Insert the file until it is correctly seated in place.

2) Depress the push button and insert the file into the chuck until it is secure then release the button.

3) Ensure that the file is secure by gently pulling and pushing the file without depressing the push button.

4) To remove the file , depress the push button and remove the file (Fig 8) .

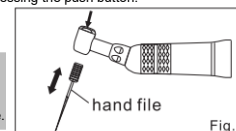


Fig.8

⚠ Caution :

●After the file is locked in place , lightly pull out the file to make sure the file.

4.4 For snap-on cups brushes

1) The polishing brush sets in the machine head ;

2) To remove the polishing head , perform the reverse steps(Fig.9).

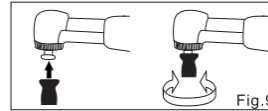


Fig.9

5.Connection of the Spray Nozzle

5.1 External Spray Nozzle

Connect the irrigation tube to the external spray nozzle firmly (Fig . 10 / 11 / 12).

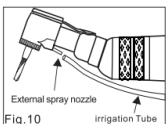


Fig.10

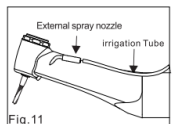


Fig.11

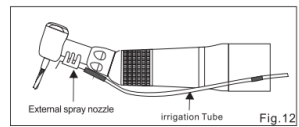


Fig.12

5.2 Internal Spray Nozzle

1) Set the nozzle holder .

2) Insert irrig ation tube in internal spray nozzle.

3) Put the internal spray nozzle into the head firmly (Fig 13 / 14).

4) Put the internal spray nozzle into the slot on the nozzle holder.

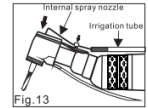


Fig.13

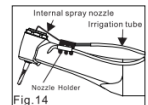


Fig.14

5.3 External and Internal Spray Nozzle Irrigation together

Connect the ends of the y-connector to the external spray nozzle and internal spray nozzles refer as detailed in procedures (1) and (2(Fig . 15 / 16).

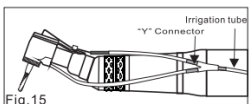


Fig.15

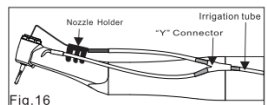


Fig.16

6. Checking the Handpiece Before Each Use

Follow the check procedure below before use . If any abnormalities are found , stop using the handpiece immediately and contact your dealer .

1) Check the head cap or cap is firmly tightened.

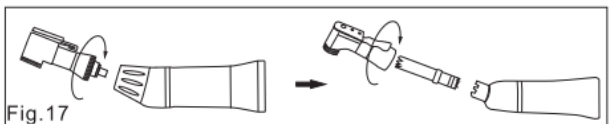
2) Insert the bur / file. (refer to 4 . Mounting / Removing the bur)

3) Rotate the handpiece for about one minute at the max rotation speed of the attached motor. During rotation , check for abnormalities such as abnormal rotation vibration.

4) After the handpiece rotation has completely stopped , touch the handpiece head to confirm the confirm the head is not heating abnormally.

7 . Replacing the Cartridge

7.1 Ordinary Latch Chuck Type



1) Loosen the coupling sleeve counterclockwise , remove the head and drive shaft (Fig . 17).

2) Unscrew the head cover with the supplied wrench then turn the wrench counter clockwiseto loosen the cover , remove the cover . Remove the cartridge (Fig . 18).

3) Insert a new cartridge into the head.

4) Completely insert the cartridge until the cartridge end face aligns with the end face of the handpiece head (Fig 19).

5) (C3-10) Remove the screw from the head using the supplied screw , and remove the cartridge (Fig . 20).

6) Tighten the head cover with the supplied wrench / screwdriver , and to assemble the parts.

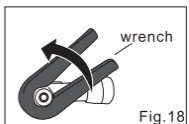


Fig.18

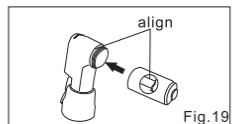


Fig.19

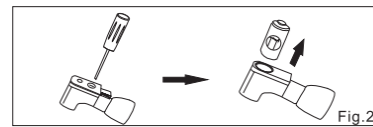


Fig.20

7.2 Ordinary Push Button Type

1) Loosen the coupling sleeve counterclockwise , remove the head and drive shaft.

2) Locate the correct wrench tool on the head cap then turn the wrench counter counterclock wise to loosen the cap , remove the cap (Fig . 22).

3) Insert a new cartridge into the head (Fig 23).

4) Completely insert the cartridge until the cartridge end face aligns with the end face of the handpiece head.

5) Tighten the head cover with the supplied wrench / screw drive , and to assemble the parts.

6) C3-11 remove the cartridge , remove the head and drive shaft , and the cartridge can be removed from the front cover of the head.

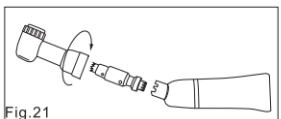


Fig.21

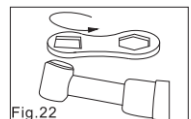


Fig.22

Fig.23

7.3 Inner Spray

1) Remove the screw from the fuselage using the supplied screwdriver (Fig . 26).

2) Pull out the headstock 3-piece set and unscrew the drive assembly (Fig . 27).

3) Locate the correct wrench tool on the head cap then turn the wrench counter clockwiseto loosen the cap , remove the cap.

4) Insert the new m ıt is in place.

5) Tighten the back n accordance with this （Fig. 28）

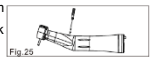


Fig.25

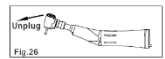


Fig.26

7.4 1 : 5 Hand piece

1) First use a Phillips screwdriver to unscrew the back screw of the Geared Angle Handpieces, as shown in Figure (Fig.25).

2) Pull out the head and toothed shaft assembly (Fig . 26).

3) Locate the correct wrench tool on the head cap then turn the wrench counter clockwise to loosen the cap , remove the cap (Fig . 27).

4) Completely insert the cartridge until the cartridge end face aligns with the end face of the handpiece head.

5) Tighten the back cover first, then assemble the other accessories firmly in accordance with this （Fig. 28）

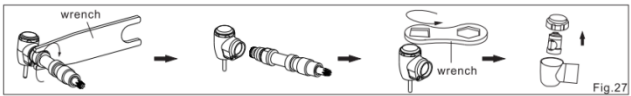


Fig.27

7.5 Kavo Type Hand piece

1) Counterclockwise rotating activity sets , until the removal of the 3 pieces.

2) With the provide screwdriver , remove the screws on the center shaft , and remove the drive shaft from the head.

3) Locate the correct wrench tool on the head cap then turn the wrench counter counterclockwise to loosen the cap , remove the cap.

4) Insert a new cartridge into the head (Fig . 28).

5) Tighten the head cover with the supplied wrench / screwdriver , and to assemble the parts.

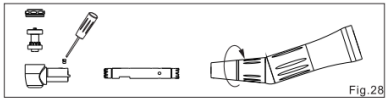


Fig.28

8.Cleaning, Disinfection and Sterilization

Device:	Air Motors
Advice:	Reprocessing procedures have only limited implication to this dental instrument. The limitation of the numbers of reprocessing procedures is therefore determined by the function / wear of the device. From the processing side there is no maximum number of allowable

	reprocessing. The device should no longer be reused in case of signs of material degradation. In case of damage the device should be reprocessed before sending back to the manufacturer for repair.
Reprocessing Instructions	
Preparation at the Point of Use:	Disconnect the handpiece from tube. Remove gross soiling of the instrument with cold water (<40° C) immediately after use. Don't use a fixating detergent or hot water (>40° C) as this can cause the fixation of residuals which may influence the result of the reprocessing process. Store the instruments in a humid surrounding.
Transportation:	Safe storage and transportation to the reprocessing area to avoid any damage and contamination to the environment.
Preparation for Decontamination:	The devices must be reprocessed in a disassembled state, as far as possible.

Pre-Cleaning:	Do a manual pre-cleaning, until the instrument are visually clean. Submerge the instruments in a cleaning solution and flush the lumens with a water jet pistol with cold tap water for at least 10 seconds. Clean the surface with a soft bristol brush.
Cleaning:	Regarding cleaning/disinfection, rinsing and drying, it is to distinguish between manual and automated reprocessing methods. Preference is to be given to automated reprocessing methods, especially due to the better standardizing potential and industrial safety. Automated Cleaning: Use a washer-disinfector meeting the requirements of the ISO 15883 series. Put the instrument into the machine on a tray. Connect the instrument with the WD by using suitable adapter and start the program: ● 4 min pre-washing with cold water (<40℃) ● emptying

	• 5 min washing with a mild alkaline cleaner at 55℃ • emptying • 3 min neutralising with warm water (>40℃) • emptying • 5 min intermediate rinsing with warm water (>40℃) • emptying The automated cleaning processes have been validated by using 0.5% neodisher MediClean forte (Dr. Weight). Note Acc. to EN ISO 17664 no manual reprocessing methods are required for these device. If a manual reprocessing method has to be used, please validate it prior to use.
Disinfection:	Automated Thermal Disinfection in washer/disinfector under consideration of national requirements in regards to A0 value (see EN 15883). A disinfection cycle of 5 min disinfection at 93℃ has been validated for the device to achieve an A0 value of 3000.

Drying:	Automated Drying: Drying of outside of instrument through drying cycle of washer/ disinfector. If needed, additional manual drying can be performed through lint free towel. Insufflate cavities of instruments by using sterile compressed air.
Functional Testing, Maintenance:	Visual inspection for cleanliness of the instruments and reassembling, if required. Functional testing according to instructions of use. If necessary, perform reprocessing process again until instrument is visibly clean. Before packaging and autoclaving, make sure that the handpiece has been maintained acc. to manufacturer’s instruction.
Packaging:	Pack the instruments in an appropriate packaging material for sterilization. The packaging material and system refer to EN ISO 11607.
Sterilization:	Sterilization of instruments by applying a fractionated pre-vacuum steam sterilization process (according to EN 285 /EN 13060 /EN ISO

	17665) under consideration of the respective country requirements. Minimum requirements: 3 min at 134℃ (in EU: 5 min at 134℃) Maximum sterilization temperature: 137℃. Drying time: For steam sterilization, we recommend a drying time of 15 to 40 minutes. Choose a suitable drying time, depending on the autoclave and load. Refer to the autoclave’s instructions for use. After sterilization: a. Remove the product from the autoclave. b. Let the product cool down at room temperature for at least 30minutes. Do not use additional cooling. Check that the sterilization wraps or pouches are not damaged. Flash sterilization is not allowed on lumen instruments!
Storage:	Storage of sterilized instruments in a dry, clean and dust free environment at modest temperatures, refer to label and instructions for use.

Reprocessing validation study Information:	The above-mentioned reprocessing process (cleaning, disinfection, sterilization) has been successfully validated. Refer to test reports: - FOSHAN COXO_Cleaning Disinfection Validation Report - FOSHAN COXO_Sterilization Validation Report_Straight Handpiece, Air Motors - FOSHAN COXO_Sterilization Validation Report_High-speed air turbine handpiece
Additional Instructions: None	
It is the duty of the user to ensure that the reprocessing processes including resources, materials and personnel are capable to reach the required results. State of the art and often national law requiring these processes and included resources to be validated and maintained properly.	

Lubrication

1.Handle oil lubrication

1) Align the grease fitting with the air inlet of the mobile phone ,and press it after pressing; the fuel injection pipe must be upright when injecting;

2) Place the handset head down;

3) Spray the cleaned lubricant to the machine head.

Note : Once you see any dirt on the machine head , repeat the entire hygiene and maintenance procedures!

Movement of the movement : The movement should pay attention to oil maintenance to prevent impurities and rust.

Note : The recommended period of lubrication is before and after each sterilization !

Before sterilizing . please clean . disinfect and lubricate the Geared angle !

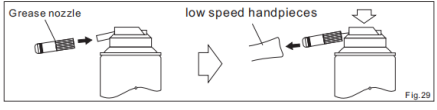


Fig.29

9. Environment Conditions

Operating environment:

Ambient temperature: +5°C +40°C

Relative humidity: 20% - 80%RH
Air pressure: 860hPa-1060hPa

Transportation and storage conditions:

Ambient temperature: -10°C +55°C

Relative humidity: ≤93%RH
Air pressure: 500hPa-1060hPa

10. Recycling and disposal

Recycling

COXO places special emphasis on environmental responsibility, the handpieces and packaging are designed to be as environmentally friendly as possible.

Disposal of the handpieces

-Dispose of old equipment according to the laws ,regulations and standards of your country (region).

-Ensure that all parts are free from contamination during disposal.

11. Standard Symbols

Warning

Caution

Certified to MDD93/42/EEC

Autoclave

Thermo-Disinfector

Type B applied part

LOT Batch code

SN Serial number

Class II equipment

Manufacturer

Refer to Instruction Manual/Booklet

Do not dispose of with domestic waste

EC REP Authorized representative in the European Community

12. Life Expectancy

Expected service life is 5 years . (see the label for production date)

13. Troubleshooting

Trouble	Possible Cause	Solution
Body of straight head and contra angle rotates during motor running	O-ring on the nose of motor wears	Change o-ring
Handpiece fail to rotate	Contra angle chucking with bur but latch place fail to be fixed in the proper position Dirt get into handpiece.	Clean and lubricate , move it by hand

This product can be repaired by professional maintenance personnel on site, and accessories required for maintenance are purchased from COXO ordistributors. Our service center can offer technical assistance to you.

14. Warranty

COXO grants the user a 12 months guarantee for its complete product range, except ball bearing (3 months guarantee) from the date of invoice issued. Maintenance over the term of guarantee will be at the customer's charge.

COXO will not be responsible for damage or injury resulting from:

- Excessive use.
- improper manipulation of the product, or modification to product carried out by persons not authorizes by COXO.
- Fail to follow the instuction to install,operate and maintenance the handpiece.
- Damage of chemical,electrical or electrolysis due to improper autoclaving and storing.
- improper working pressure.

15. Guidance and manufacturer's declaration-EMC

This product needs special precautions regarding EMC and needs to be installed and put into service according to theEMC information provided, and this unit can be affected by portable and mobile RF communications equipment.

⚠ **Caution:**

- Do not use a mobile phone or other devices that emit electromagnetic fields, near the unit. This may result in incorrectoperation of the unit.
- This unit has been thoroughly tested and inspected to assure proper performance and operation!
- This machine should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use isnecessary, this machine should be observed to verify normal operation in the configuration in which it will be used.

Guidance and Manufacture's Declaration – Electromagnetic Emission		
The High-speed air turbine handpiece is intended for use in the electromagnetic environment specified below. The customer or the user of the High-speed air turbine handpiece should assure that it is used in such an environment.		
Emission test	**Compliance**	**Electromagnetic Environment – Guidance**
RF emissions CISPR 11	Group 1	The High-speed air turbine handpiece use 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 emission CISPR 11	Class B	The High-speed air turbine handpiece is suitable for use in all establishments, including domestic establishments directly connected to the public low-voltage power supply network with specific requirement.
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not applicable	

Guidance and Manufacture's Declaration – Electromagnetic Immunity			
The High-speed air turbine handpiece is intended for use in the electromagnetic environment specified below. The customer or the user of High-speed air turbine handpiece should assure that it is used in such an environment.			
Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment - Guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV contact ±4 kV, ±8kV,±15 kV air	±8 kV contact ±4 kV, ±8kV, ±15 kV air	Floors should be wood, concrete or ceramic tile. If floor are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2kV for power supply lines ±1 kV for Input/output lines	Not applicable	Mains power quality should be that of atypical commercial or hospital environment.
Surge IEC 61000-4-5	±0.5 kV & ±1 kV differential mode ±0.5 kV, ±1 kV & ±2kV common mode	Not applicable	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 IEC 61000-4-11	100 % U_T (100% dip inU_T.) for 0.5 cycle 100 % U_T (100% dip inU_T.) for 1 cycle 30 % U_T (70% dip in U_T) for25/30 cycles 100 % U_T (100% dip inU_T.) for 250/300 cycle	Not applicable	Mains power quality should be that of a typical commercial or hospital environment. If the user of the High-speed air turbine handpiece requires continued operation during power mains interruptions, it is recommended that the High-speed air turbine handpiece be powered from a unit eruptible power supply or a battery.
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.
NOTE:U_T is the a.c. mains voltage prior to application of the test level.			

Guidance and Manufacture's Declaration – Electromagnetic Immunity			
The High-speed air turbine handpiece is intended for use in the electromagnetic environment specified below. The customer or the user of High-speed air turbine handpiece should assure that it is used in such an environment.			
Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment - Guidance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz 6 Vrms in ISM Bands 3 V/m 80 MHz to 2.7 GHz	Not applicable	Portable and mobile RF communications equipment should be used no closer to any part of the High-speed air turbine handpiece, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended Separation Distance $d=1.2\times P^{1/2}$ $d=1.2\times P^{1/2}$ 80 MHz to 800 MHz $d=2.3\times P^{1/2}$ 800 MHz to 2.5 GHz

Radiated RF IEC 61000-4-3	385MHz- 5785MHz Test specifications for ENCLOSURE PORT IMMUNITY to RF wireless communication equipment (Refer to table 9 of IEC 60601-1-2:2014)	385MHz- 5785MHz Test specifications for ENCLOSURE PORT IMMUNITY to RF wireless communication equipment (Refer to table 9 of IEC 60601-1-2:2014)	Where 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,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol:

NOTE 1: U_T is the a.c. mains voltage prior to application of the test level .

NOTE 2:At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 3: 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 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 High-speed air turbine handpiece is used exceeds the applicable RF compliance level above, the High-speed air turbine handpiece should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the High-speed air turbine handpiece.

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

Recommended separation distances between portable and mobile RF communications equipment and the High-speed air turbine handpiece

The High-speed air turbine handpiece is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the High-speed air turbine handpiece can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the High-speed air turbine handpiece 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**		
	150 kHz to 80 MHz $d=1.2\times P^{1/2}$	80 MHz to 800 MHz $d=1.2\times P^{1/2}$	800 MHz to 2.5 GHz $d=2.3\times P^{1/2}$
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.

NOTE1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.