

DMCX



Instruction

REF 2100253-0000/ENG

English

Medical devices entirely made in Switzerland by Bien-Air Dental SA.

Type

Electronic control for Bien-Air Dental micromotors. Brushless micromotors without sensors, with current limiting function and speed.

Intended use

Product intended for professional use only. Use in dentistry for prophylaxis, general dentistry. Any use other than that for which this device is intended is prohibited and may prove dangerous.

Technical data

Classification

Class IIa in accordance with European Directive 93/42/EEC concerning medical devices.

Dimensions

102 x 58 x 27 mm

Weight

approx. 53 g

Voltage

32 Vdc ± 10%

Description

For device references, see fig. 2 ⑥.
MCX system: consists of an MCX motor, MCX hose, and DMCX electronic control.

Current limitation:

Micromotor MCX: 5 A

Electric power supply nominal power rating:

60 VA

Connectors and wiring diagram

see fig. 1 and fig. 2.

- ① Feed voltage
- ② Motor and light
- ③ Analogue inputs
- ④ DIP switches
- ⑤ Air pressure sensor
- ⑦ Diagnostic LEDs
- ⑧ RS 232

ON

The green LED is lit when the board is powered on

DG

The red LED flashes (1-7 times) when a fault occurs (see fault list)

RS

The amber LED flashes during RS232 communication

Fault list

Fault 1:

Short circuit in motor or cord

Fault 2:

Motor live disconnected in motor or cord

Fault 3:

RS232 communication cut

Fault 4:

EEPROM memory fault

Fault 5:

Motor control overheating

Fault 6:

Motor control voltage too low

Fault 7:

Motor control voltage too high

The general wiring diagram shows all the main connections of the complete MCX system. The connections actually required depend on the integration of the MCX system in the unit and the desired functions.

The table below describes the main characteristics of each connection described in the wiring diagram.

Precautions to be taken during integration

- During integration, only use a medical supply that conforms to standards EN / IEC 60601-1 and EN / IEC 60601-1-2, respecting the required withstand voltage, creepage distances and distances in air.
Following integration, the complete assembly becomes an EM system.
- Connect the ground (GND) of all the electronic controls connected to the DMCX. This also applies to digital interfaces.
- The motor light must be powered from the DMCX.
Do not use another power supply for the light.
- The input voltage levels can be configured via the RS-232 serial interface (document available on request).
- For more information or if you have any questions about the integration, wiring configuration or programming of the MCX system, please contact your Bien-Air Dental representative.
- Only use accessories, transducers and cables specified by Bien-Air Dental SA.

Protection installed

Temperature

- The motor outer surface and electronic control temperatures are continuously controlled by the system.

Power supply

- The electronic control system is protected against over- and undervoltage, and also against polarity reversal.

Motor and light

- The motor output (phases) is protected against short circuits.
- The light output is protected against short circuits.
- Interruption of one, two or three phases is detected by the system, and the motor either does not start or stops.

Exhaust air

REF 249.39.11: this system is only necessary if the device is pneumatically-controlled, with the air pedal in the raised position, and if the valve controlled by the pedal is not fitted with a vent. Contact your dealer for fitting.

Standards

This electronic control conforms to electrical safety standards in line with standard IEC 60601-1 and those governing electromagnetic compatibility in line with standard IEC 60601-1-2.

Electromagnetic compatibility

Corresponds to the electromagnetic compatibility in accordance with IEC 60601-1-2. Declaration by the manufacturer regarding electromagnetic compatibility: refer to the tables on pages 3-4.

Information

The technical specifications, illustrations and dimensions contained in these instructions are given only as a guide. They may not be the subject of any claim.

Description ref.	Diagram	Specification	Notes
DMCX REF 1501566-001			
Voltage	Input -	32 Vdc +/- 10%	
Speed reference	Input	0 to 5 Vdc (linear)	Pull-down Input
MUX IN Motor	Input	0 or 5 Vdc (TTL)	Pull-down Input
Rotation (CW/CCW)	Input	0 or 5 Vdc (TTL)	Pull-down Input
Brightness	Input	0 to 5 Vdc (16 output levels)	Pull-up Input
Pneumatic pressure, reference	Input	0 to 3 bar (0 to 300 kPa, 0 to 43.5 psi)	
Motor Power	Output	Phases A, B, and C	
Motor Light	Output	L+ / L-	
MUX OUT Motor	Output	24 Vdc, Max. current = 100mA	
RS-232	Digital interface		

Voltage converter REF 1500580-001

Voltage	Input	22 to 27 Vac or 22 to 37 Vdc
Voltage	Output	24 Vdc (24W peak / 12W cont)
Voltage	Output	32 Vdc (130W peak / 60W cont)

Dual Motor Switch REF 1500554-001

IN motor	Input	3 motor phases: A, B, C (Max. current = 6A) 2 light connections L+, L- (Max. current = 3A)	Max. relay current
MUX Control	Input	24 Vdc, 200mW	Max. relay current
EV In	Input	Solenoid valve input (24 Vdc)	
OUT motor 1	Output	3 motor phases: A, B, C (Max. current = 6A) 2 light connections	Max. relay current
OUT motor 2	Output	3 motor phases: A, B, C (Max. current = 6A) 2 light connections	Max. relay current

Operating mode selection by DIP-Switches

The 4 DIP-Switches are used to configure the system, and in particular to select the operating mode (see table below). For more information and technical support, please contact your Bien-Air Dental SA dealer.

DIP-Switches	1	2	3	4	5	6
	Mode	Function	Unused			

The serial mode protocols for mode 3 are available on request from your Bien-Air Dental SA dealer.

0 = OFF 1 = ON

Mode	Dip switches				Description
	1	2	3	4	
0	0	0	X	X	Electric mode from 1000 rpm to 40.000 rpm
1	0	1	X	X	Pneumatic mode from 1000 rpm to 40.000 rpm
2	1	0	X	X	Pneumatic mode with electric limitation
3	1	1	X	X	Serial mode (RS232)
All	X	X	1	X	Status frame auto-send (1 = enabled, 0 = disabled)
All modes except 3	X	X	X	1	Light delay (1 = enabled, 0 = disabled)
Mode 3 only	1	1	X	1	Frame check (0 = checksum, 1 = CRC)

Main functions and controls

- Pneumatic control.
- Electric control by analogue inputs or digital interface (RS-232)
- Control with up to two MCX motors (using Dual Motor Switch REF 1500554)
- The system variable parameters are as follows:
 - Speed range 1000 - 40.000 rpm (maximum torque of over 2.0 Ncm available across the full speed range)
 - Progressive or ON/OFF mode speed adjustment
 - Brightness control (16 settings) or light ON/OFF
 - Reversal of rotation direction (clockwise/anti-clockwise)

The manufacturer reserves the right to make technical improvements to its equipment, without amending these instructions. For all additional information, please contact Bien-Air Dental SA at the address indicated on the back cover.

Options

Converter 24/32-24 REF 1500580-001

The DMCX is fed by 32 Vdc +/-10%. If your system only has a 24 Vac feed, we recommend that you use this converter. This accessory enables you to obtain optimum performance from the MCX system, by providing two stabilised voltages: 32 Vdc (60W continuous, 130W peak) for the MCX motor feed.

Dual Motor Switch REF 1500554-001

We recommend this module when using 2 MCX motors with a DMCX board. It allows switching of the 3 motor phases, the 2 light connections. The relays are switched simultaneously and controlled by the MUX Control input (24 Vdc).

To connect this electronic control to the MCX system, please consult the wiring diagram.

Disposal

This device must be recycled. Electrical and electronic equipment may contain dangerous substances which constitute health and environmental hazards.

The user must return the device to its dealer or establish direct contact with an approved body for treatment and recovery of this type of equipment (European Directive 2002/96/EC).

Maintenance

Only use maintenance products and components from Bien-Air Dental. The use of other products and components can void the guarantee.

Servicing

Never disassemble the device. For any modification and repair, we recommend that you contact your regular supplier or Bien-Air Dental directly. Bien-Air Dental asks the user to have its dynamic instruments checked or inspected at least once a year.

Environment

Working

- Temperature: +10°C (50°F) to +40°C (104°F)
- Relative humidity: 30% to 80%, including condensation
- Atmospheric pressure: 700 hPa to 1060 hPa

Transport and storage

Environmental conditions for a period of max. 15 weeks

- Temperature: -25°C (-13°F) to +70°C (158°F)
- Relative humidity: 10% to 95%.
- Atmospheric pressure: 500 hPa to 1060 hPa

Other precautions for use

The device must be used by a qualified person in accordance with the current legal provisions concerning industrial safety, health and accident prevention measures, and these working instructions. In accordance with these requirements, the operators:

- must only use operating devices that are in perfect working order; in the event of irregular functioning, excessive vibration, abnormal heating or other signs indicating malfunction of the device, the work must be stopped immediately; in this case, contact a repair centre that is approved by Bien-Air Dental;
- must ensure that the device is used only for the purpose for which it is intended, must protect themselves, their patients and third parties from any danger, and must avoid contamination through the use of the product.

The device is not authorised for use in an explosive atmosphere (anaesthetic gas).

Avoid any contact with liquids.

Guarantee

Terms of guarantee

Bien-Air Dental grants the user a guarantee covering all functional defects, material or production faults.

The device is covered by this guarantee for 12 months from the date of invoicing.

In the event of justified claim, Bien-Air Dental or its authorised representative will fulfill the company's obligations under this guarantee by repairing or replacing the product free of charge.

Any other claims, of whatever nature, in particular in the form of a claim for damages and interest, are excluded.

Bien-Air Dental shall not be held responsible for damage or injury and the consequences thereof, resulting from:

- excessive wear and tear
- improper use
- non-observance of the instructions for installation, operation and maintenance
- unusual chemical, electrical or electrolytic influences

- poor connections, whether of the air, water or electricity supply.

The guarantee does not cover flexible "fibre optic" type conductors, or any parts made of synthetic materials.

The guarantee shall become null and void if the damage and its consequences are due to improper manipulation of the product, or modifications to the product carried out by persons not authorised by Bien-Air Dental.

Claims under the terms of the guarantee will be considered only on presentation, together with the product, of the invoice or the consignment note, on which the date of purchase, the product reference and the Serial No. should be clearly indicated.

Installation:

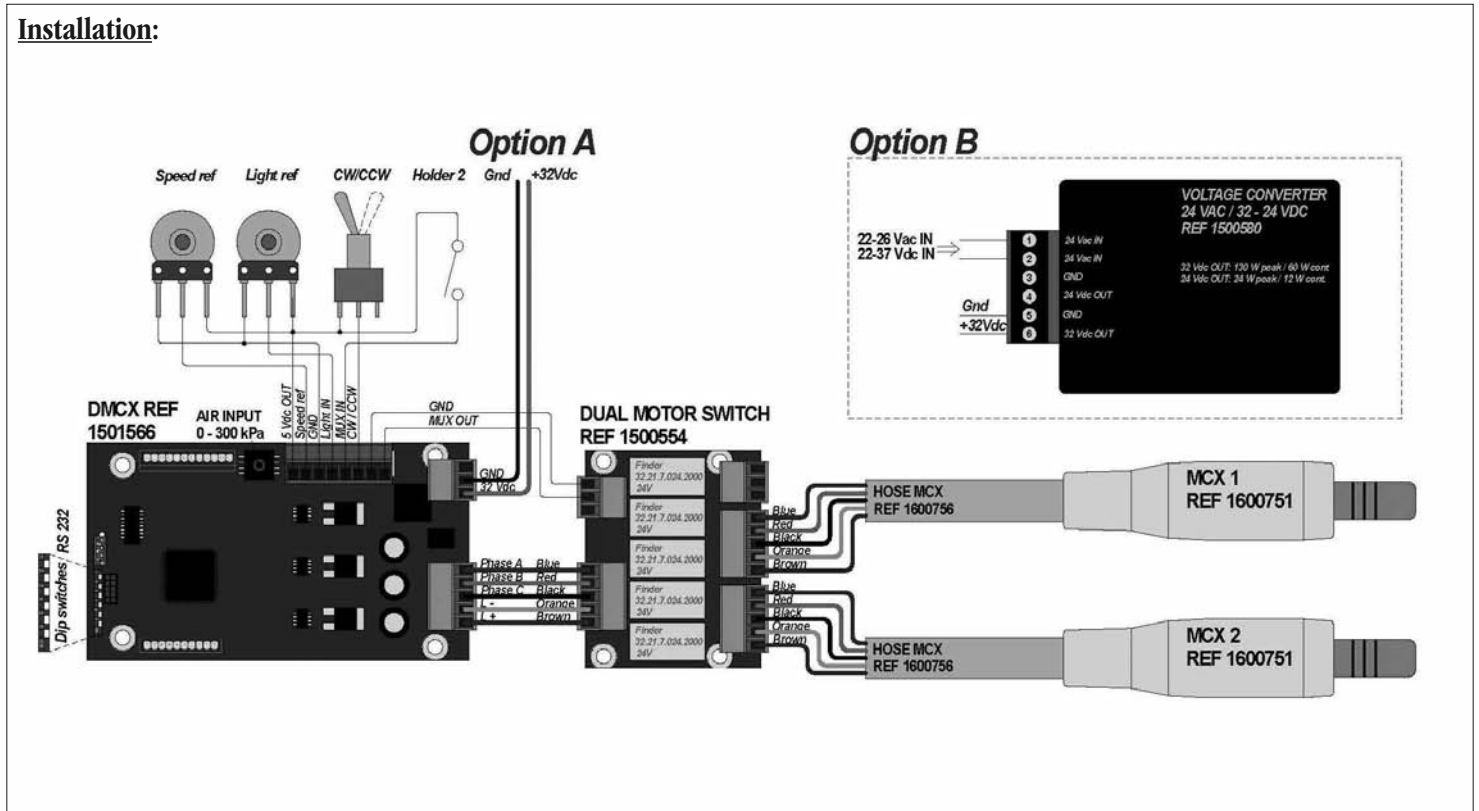


fig. 1

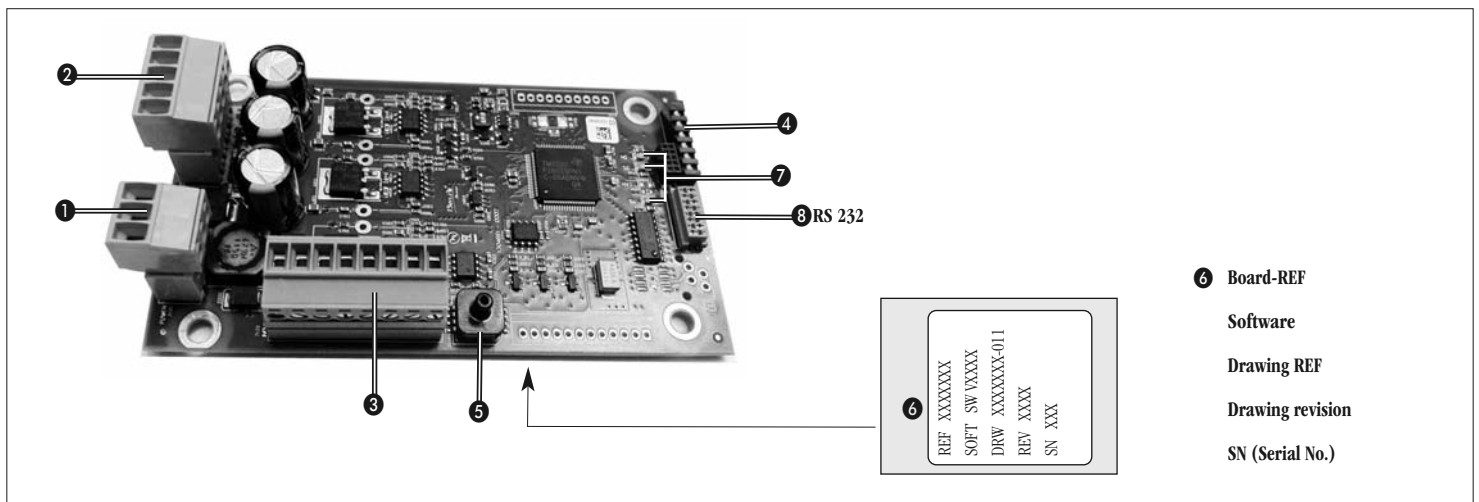


fig. 2

Precautions regarding Electromagnetic Compatibility (EMC)

Medical electrical equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the user's manual and in the present document.

The DMCX complies with the EMC requirements according to IEC 60601-1-2. Radio transmitting equipment, cellular phones, etc. shall not be used in the close proximity of the device since this could influence the performance of the device. Particular precaution must be considered during use of strong emission sources such as High Frequency surgical equipment and similar so that e.g. the HF cables are not routed on or near the device. If in doubt, please contact a qualified technician or Bien-Air Dental.

The DMCX should not be used adjacent or stacked with other equipment. If adjacent or stacked use is necessary, the DMCX should be observed to verify normal operation in the configuration in which it will be used.

WARNING!

The use of accessories, transducers and cables other than those specified, with the exception of transducers and cables sold by Bien-Air as replacements parts for internal components, may result in increased emissions or decreased immunity of the DMCX.

Guidance and manufacturer's declaration – electromagnetic emissions

The DMCX is intended for use in the electromagnetic environment specified below. The customer or the user of the DMCX should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The DMCX 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 CISPR 11	Class B	The DMCX 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 purposes.
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not applicable	

Guidance and manufacturer's declaration – electromagnetic immunity

The DMCX is intended for use in the electromagnetic environment specified below. The customer or the user of the DMCX 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	±2 kV contact ±4 kV contact ±6 kV contact ±2 kV air ±4 kV air ±8 kV air	±2 kV contact ±4 kV contact ±6 kV contact N.A. N.A. N.A.	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 IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines N.A.	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±0.5 kV line to line ±1 kV line to line ±0.5 kV line to earth ±1 kV line to earth ±2 kV line to earth	N.A. N.A. N.A. N.A. N.A.	N.A.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % <i>UT</i> (>95 % dip in <i>UT</i>) for 0,5 cycle 40 % <i>UT</i> (60 % dip in <i>UT</i>) for 5 cycles 70 % <i>UT</i> (30 % dip in <i>UT</i>) for 25 cycles <5 % <i>UT</i> (>95 % dip in <i>UT</i>) for 5 sec	N.A. N.A. N.A. N.A.	N.A.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	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.

Essential performance: The essential performance is the maintaining of the visual lighting intensity of the LED and the maintaining of motor speed. Maximum allowed speed deviation is ± 5%.

Guidance and manufacturer's declaration – electromagnetic immunity

The DMCX is intended for use in the electromagnetic environment specified below. The customer or the user of the DMCX 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	3 V	Portable and mobile RF communications equipment should be used no closer to any part of the DMCX, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 1.2\sqrt{P}$ 800 MHz to 2,5 GHz $d = 2.3\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	
			where <i>P</i> is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and <i>d</i> is the recommended separation distance in metres (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 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 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 DMCX is used exceeds the applicable RF compliance level above, the DMCX should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the DMCX.

^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 DMCX

The DMCX is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the DMCX can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the DMCX as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of the transmitter W	Separation distance according to frequency of transmitter 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
0.1	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 metres (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.

This product may be covered by one or more of the following patents:

EP Europe: 745358 / 688539 / 948294 / 1145688 / 1563800 / 1675523 / 1753360 **DE Germany:** 29616023.7
DK Denmark: 9600315 **FR France:** 2722972 **CH Switzerland:** 693922 **CN China:** 100528099 / 100522100 / 100522099 / 100553584 **JP Japan:** 3892485 / 4298933 / 7000419 **US United-States:** 5453008 / 6033220 / 6319003 / 7214060 / 7448870
RU Russia: 2361540 / 2361541 / 2372046

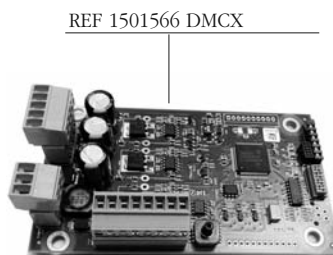
REF 1600811-001 BOARD DMCX

Set supplied

Set DMCX
REF 1600811-001



REF 1302411



Optional accessories



REF 1500580-001



L = 30 cm.
 REF 1500579-001



REF 1500554-001



REF 1600756-001



REF 1600824-001



REF 1600751-001



REF 1600780-001

REF	Legend
1600811-001	Set DMCX
1501566-001	Electronic DMCX
1302410-001	Upper cover
1302411-001	Lower cover
1500554-001	Dual Motor Switch
1500580-001	Converter 24/32 Vdc and 24 Vdc
249.39.11-001	Exhaust air
1600751-001	Micromotor MCX LED, with internal spray and LED
1600780-001	Micromotor MCX, with internal spray without light
1600756-001	MCX hose, grey silicon (L=1.7m)
1600756-0	MCX hose, special length (Lmax=3m)
1600824-001	B-MCX hose, grey silicone. bayonet connection to unit (L=1.7m)
1600824-0	B-MCX hose, special length (Lmax=3m)

List of Bien-Air Dental SA registered trademark products @:

Aquilon®	Eolia®	Lubrifiuid®	Prestilina®
Bora®	Gyro®	Lubrimed®	Spraynet®
Boralina®	Gyrolina®	MX®	
ChiroPro®	Isolite®	PowerCare®	

In these instructions, "Device" corresponds to the product described in the heading "Type". For example, turbine, contra-angle, handpiece, micromotor, tube, electronics, connectors, station etc.

Symbols



Manufacturer.



CE Marking with number of the notified body.



Recyclable electrical and electronic materials.



Light.

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