

XL Motion Controller V2

Datasheet

Version 1.1

valid from SW Version v949 onwards

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1. Introduction

The XL Motion Controller V2 is a controller for digital motion control for video and photo equipment. It allows to control two motor types (Clearpath BLDC motor or bipolar Stepper motor) and the triggering of shutter and focus of a connected camera. Most models of popular cameras are supported. Auxiliary input / output port for customer defined additional equipment is also available besides a 12Vdc/14Vdc and a 5Vdc stabilized output for powering of additional equipment like cameras or wireless equipment.

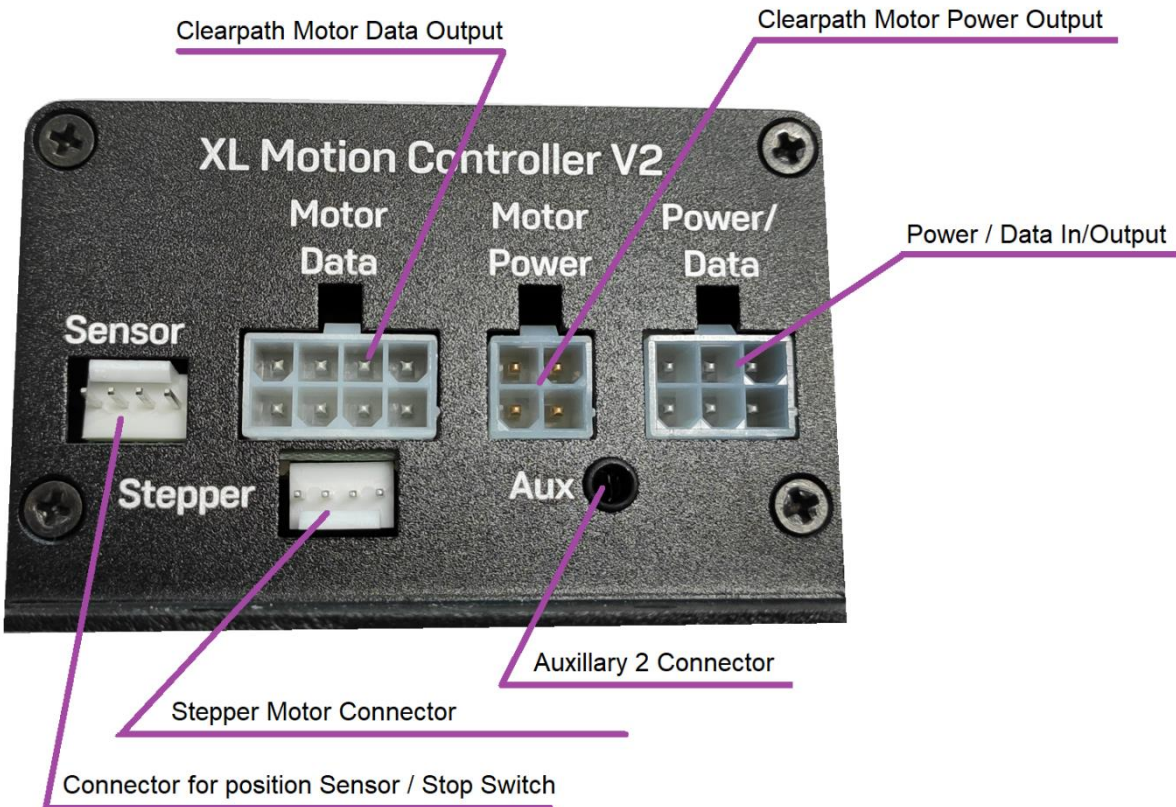
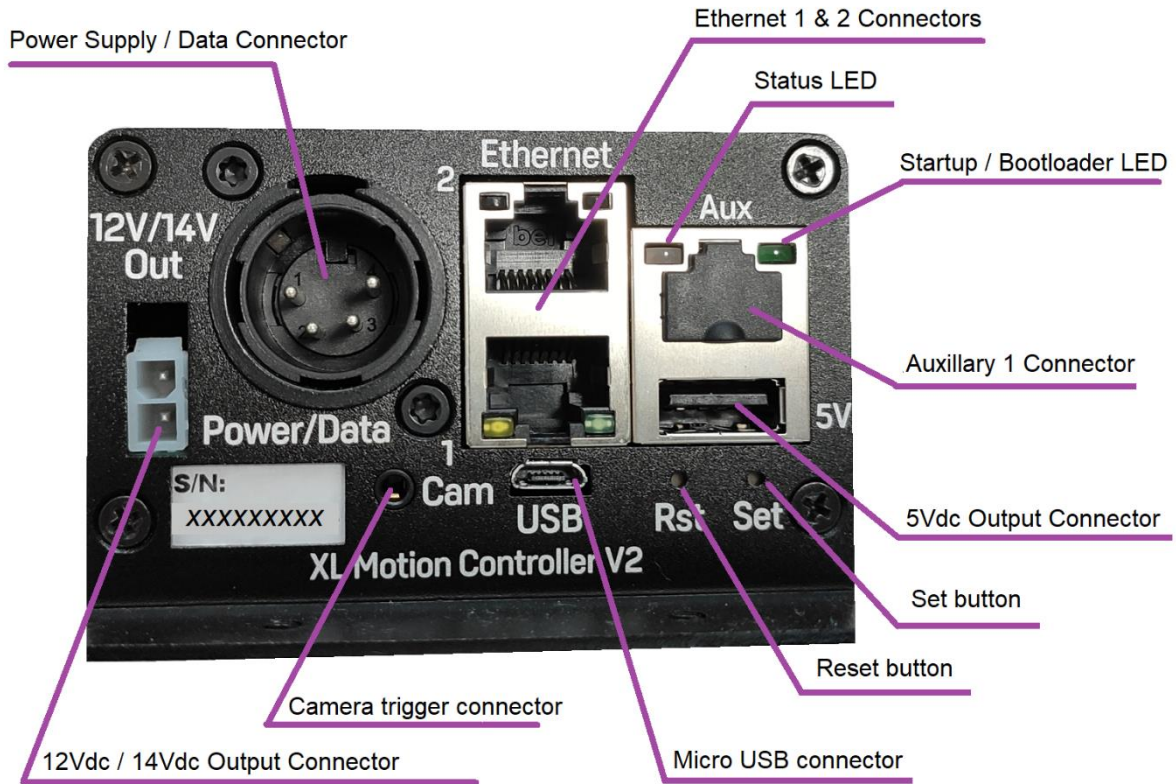
The XL Motion Controller V2 allows the control via DMX protocol as well as connecting to an Ethernet based IP system.

1.1 Technical Data

Housing	
Measurements	154 x 78 x 50mm including mounting brackets
Housing Material	aluminum, black anodized
Operating Parameters	
Temperature Range	-20°C to +40°C (-4°F to 104°F)
Maximum Relative Humidity	90%, noncondensing
Supply Voltage	12 –48 Vdc stabilized voltage (minimum 24V for Clearpath BLDC motor)
Supply Current	100mA without external load, max. 10A with full load
Connectors Front Side	
Supply/Data Connector XLR	XLR 4-pol male socket Pin 1: GND Pin 2: DMX – Pin 3: DMX + Pin 4: Supply + Input for DMX control signal. Standard DMX512 Signal with 250kbaud supported.
12V/14V Out	Molex 39301020 Stabilized 12Vdc or 14Vdc Output. , max. current 4 A output switchable and current monitored by Software. Can be used for auxiliary equipment on Slider, e.g. cameras, PTZ Cameras, Pan/Tilt Heads, Wifi or RF equipment. Waterbird Systems offers cable for powering all suited PTZ cameras on request. Pin1: GND, Pin2: +12V/14V Out, switchable via SW
5V Out (USB A)	Standard USB Type A socket with output of 5Vdc. max output current 600mA output switchable and current monitored by Software can be used for auxiliary equipment on Slider, e.g. Smartphones, action cameras, Wifi, wireless DMX or other RF equipment.
Camera Trigger Port	2,5mm (3/32") Stereo Klinke / TRS



	Sleeve: GND, Ring: Focus, Tip: Shutter Internal pull-up 3,3V, max. external pullup Voltage: 5Vdc
USB Port	USB Micro B Used for Firmware Updates and Parametrization 5Vdc supply for electronics, no supply of motors via USB
Ethernet 1 & 2	2 pcs RJ45 Ethernet Connector for integrating in IP based control systems. E.g. Connect one port to PTZ camera and connect other port to PTZ console or via Wireless Ethernet bridge to PC/PTZ console.
Auxiliary Port 1	RJ45 connector For future add-ons and customer specific applications
Connectors Back Side	
Motor Data Output	Molex 39301080 For controlling a Teknic Clearpath SDSK Series Motor
Motor Power Output	Molex 39301040 For powering a Teknic Clearpath SDSK Series Motor
Stepper Motor Output	Molex 22-05-3041 For connecting a bipolar 4-wire stepper Motor, maximum output current 1A minimal isolation voltage of motor >16V
Auxiliary Port 2	3,5mm (1/8") Stereo Klinke / TRS For future add-ons and customer specific applications
Supply/Data Connector Molex (back side)	Molex 39301060 Alternative of using the XLR connector on the front side, the control unit can be powered by this connector. Additionally, the DMX data can be feed in via this connector. Also, a 12V/14V, max 500mA output is available on this connector. Pin 1: GND Pin 2: DMX - Pin 3: GND Pin 4: Supply + Pin 5: DMX + Pin 6: 12V/14V Out
Sensor Connector	Molex 22-05-3041 Connector for magnet sensor for end position detection and optional stop switch.





1.2 Interface Definition

Power/Data Connector

The Power Supply Connector is the power source for the Control Unit and the connected Motor.

A stabilized DC voltage between 12-48 Vdc must be used (24-48V for Clearpath Motor). Typically, this voltage is supplied via an AC/DC power supply or via a Battery pack.

Camera Trigger Connector

Control Unit can control a camera through the wired remote shutter port with 2.5mm Klinke (3/32" Male TRS) connector. Standard Cables are available for most camera models on the market.

The Camera Trigger Connector provides control over the focus and shutter trigger only, it is not possible to control ISO, aperture, or other settings of the camera over this port. If you set your camera to bulb mode, the control unit can control the shutter speed (if your camera supports this mode).

Ethernet Connectors

The two Ethernet connectors can be used to include the Control Unit into IP based control systems. The second port can be used to connect a camera without the need of a second cable or wireless bridge to be used.

12Vdc/14Vdc Output Connector

This connector provides a stabilized output voltage for powering PTZ cameras, video cameras or other equipment mounted on the carriage. Standard output is 12 Vdc but for application requiring higher voltages the output can be configured to 14 Vdc.

The output is current monitored and can be switched on and off via software commands.

After a short circuit or overcurrent, the output is switch of till the next power up of the unit.

5Vdc Output Connector

This connector provides a stabilized output voltage for powering wireless equipment, smartphones, action cameras or other equipment mounted on the carriage. Output is 5 Vdc and the output is current monitored and can be switched on and off via software commands.

After a short circuit or overcurrent, the output is switch of till the next power up of the unit.

Status LED

The LED Indicator shows the status of the Control Unit. If no light is visible the Control Unit is unpowered.

If the LED Indicator is flashing slowly green the Control Unit is waiting for a connection to a Control device.



If the LED Indicator is constantly green, the Control Unit is connected to a control device and ready to be used.

If the LED Indicator is flashing orange or constant orange the Control Unit is in an error state.

Startup/Bootloader LED

If the LED Indicator is flashing green during startup of the Control Unit.

If the LED Indicator is indication Software download during firmware updates by flashing fast. During normal operation this LED is off.

USB Connector

The USB connector can be used for firmware updates. Powering the Control Unit via USB is only possible for firmware updates, no motor control is possible if no power is available on the Power Supply Connector.

Auxiliary Ports

This Ports can be used to connect accessories like a manual knob or external controls e.g. to control a light that is switching on and off before and after the picture is taken for a long duration time-lapse. Customer specific applications can be realized with these ports.

Position Sensor and Stop Switch Connector

To this Port the magnetic position switch is connected to. This allows the automatic detection of slider length during reference run. Also, a Stop switch can be added to this port where necessary.

Reset Button

This button can be pressed to reset the internal processor of the Control Unit. This also causes a sudden stop of all connected motors.

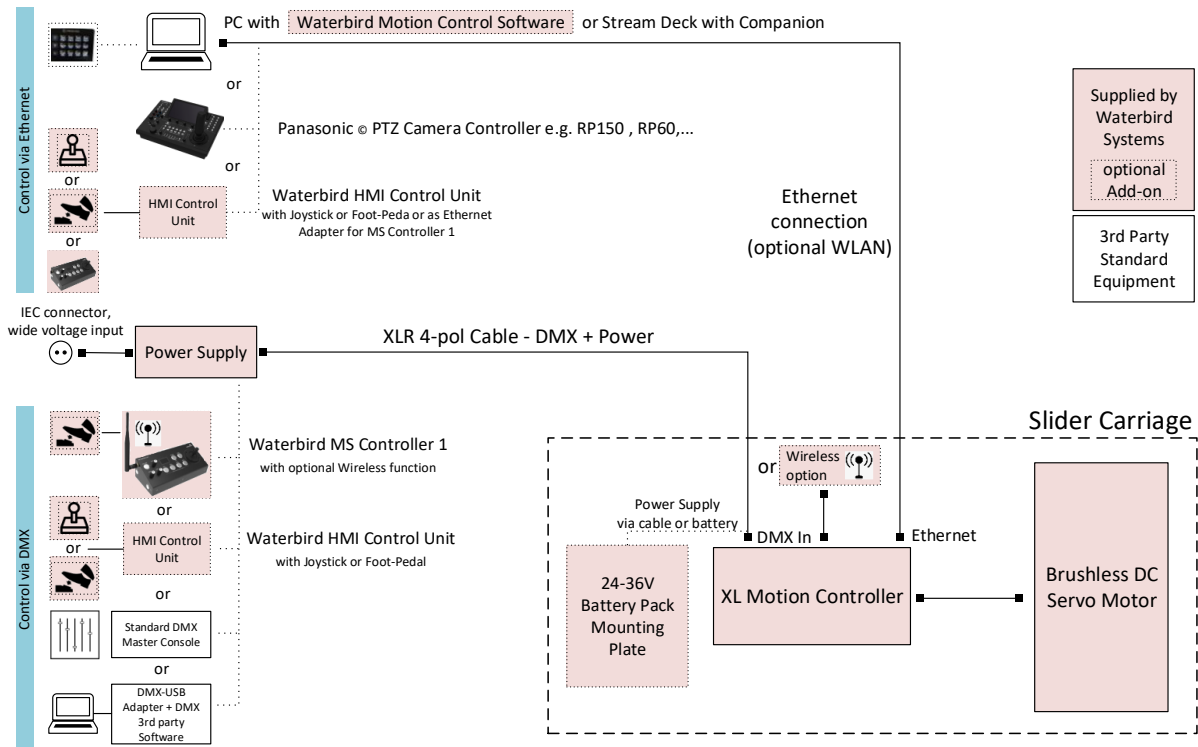
Set Button

Function to be added in later firmware versions.



1.3 Application Diagram

The Control Unit is typically used in the following Setups:





2. DMX Command List

The Control Unit uses 16-DMX channels. The start address of the DMX channels is per default address 1. The start address can be changed via a PC program via Control Unit Config tool, see chapter “Control Unit Communication Configuration”.

The commands are:

Channel	Value	Function
1	0..255	Target position of Slider
2	0..255	Fine setting Target position of Slider
3	0..255	Speed of Slider Movement
4	0..255	Fine setting Speed of Slider Movement
5	0..255	Acceleration of Slider Movement
6	0..255	Fine setting Acceleration of Slider Movement
7	0, 100, 101	<p>Mode of Slider Operation:</p> <p>0 : Normal operation - Slider follows DMX target position</p> <p>100: Automatic Ping-Pong Movement - Slider moves from start to end position and back continuously (target setting is ignored, speed and acceleration are used from DMX values)</p> <p>101: Advanced Pingpong – Movement between Mem1 & Mem2 (including Autopod & Cam movements if installed)</p> <p>all other values: reserved - do not use</p>
8	0-20, 100,200	<p>Slider referencing:</p> <p>0: Normal operation</p> <p>1-10: Go to Preset Position Nr. 1 to 10 (10 presets available)</p> <p>11-20: Save current Position as Preset Nr. 1 to 10 (10 presets available)</p> <p>100: for more than 1 sec - starts the reference run of slider</p> <p>200: De-init Slider (instant unpowering of Motor)</p> <p>all other values: reserved - do not use</p>
9	0..255	<p>12V Output switching:</p> <p>100 : Output is set off</p> <p>150 : Output is set off for 1 sec and then switched on again (e.g. to reset an external Wifi device)</p> <p>200 : Output is set on</p> <p>all other values: ignored - no state change</p>
10	0..3	<p>Cam trigger out:</p> <p>0 : Cam outputs are off (high state)</p> <p>1 : Cam Focus is on (pulled to ground)</p> <p>2 : Cam Shutter is on (pulled to ground)</p> <p>3 : Cam Focus + Shutter is on (pulled to ground) (info: most camera models need the focus also activated during shutter release)</p> <p>all other values: reserved - do not use</p>
11	0..255	Target position of Secondary Axis (e.g. Panapod/ Autopod)
12	0..255	Fine setting Target position Secondary Axis
13	0..255	Speed of Movement of Secondary Axis (e.g. Panapod/ Autopod)
14	0..255	Fine setting Speed of Movement of Secondary Axis
15	0..255	Ping Pong Pause Time – If set to > 0 the Slider waits for an set amount of time before starting the next run in Pingpong Mode
16	0..255	Fine setting of Ping Pong Pause Time



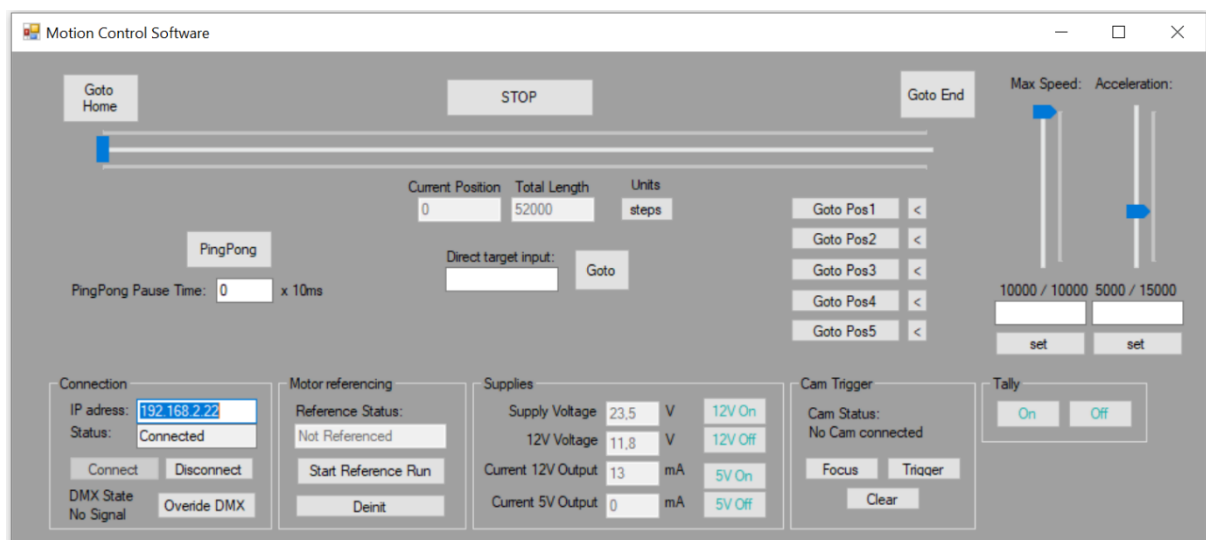
3. Control via Ethernet

The XL Motion Controller allows to control the Slider Movement and auxiliary functions via Ethernet. For this the Motion Control Software is available (addition license necessary).

For control via Ethernet the XL Motion Controller needs to be attached to an Ethernet network and the IP address must be set according to your network needs.

For setting the IP address see chapter “Control Unit Communication Configuration”.

At startup of the Motion Control Software the IP address of the XL Motion Controller needs to be entered and the connection is started by clicking the “Connect” button in the left bottom.



After successful connection, the Status in the connection area shows “Connected” and the slider can be referenced. For this click the “Start Reference Run” button – the slider moves to both ends to learn the length and position of the system.

After referencing, the Slider can be controlled manually to a certain position by dragging the virtual position slider on top of the user interface to a certain position or entering the desired position in the “Direct target input” box and pressing “goto” button.

Via the controls on the right the speed and acceleration of the slider movements can be changed.

Current position can be saved by clicking on the small arrow buttons right to the “Goto Pos” buttons. To move again to the stored position, click in the corresponding “Goto Pos” button.

The “PingPong” button activates the automatic movement between the two end positions and allows to set a pause time between the movements.



4. Control Unit Communication Configuration

The Control Unit Config Tool allows to change the DMX start address and to change the IP address of the control Unit and the camera that shall be controlled.

For changing the settings use a Micro-USB cable to connect the control Unit to a PC running MS Windows 10.

The current values will be shown on startup of the tool. In the white fields the values can be changed according to your application needs and then be written to the XL Motion Controller by clicking on the corresponding “Write” button.

The DMX Start address will be taken over instantly while the new IP address needs a power cycle of the XL Motion Controller to become active.

If a connected PTZ camera shall be controlled including the memory positions, the IP address of the camera must be set in the control unit by entering in the field “IP Address of controlled device”.

Procedure:

- 1) Disconnect power supply from control unit.
- 2) Switch off Bluetooth function on device that was paired with the Slider Control Unit in case Bluetooth was used.
- 3) Connect Micro USB Cable to Slider Control Unit and other End of Cable to PC
- 4) Wait for 30sec
- 5) Start Control Unit Config Tool
- 6) Select new DMX address / IP settings
- 7) Click "Write" Button of the setting you would like to change
- 8) Close Control Unit Config Tool
- 9) Disconnect USB cable
- 10) Power up control unit again



5. Handling and Safety Instructions

The Control Unit is designed to be mounted in the sliders carriage by 4 screws. Do not use another method of fixing the Control Unit to the Slider.

Do not use the Control Unit in wet or humid environment like rain, snow, spray or waterfalls without extra protection against humidity intrusion into the electronics.

Do not install this Unit near a heater, inflammable material or oily or dusty location or in a location continuously exposed to direct sunlight or in a location where gas may leak.

Do not cover the Control Unit with metal objects to ensure proper operation of the wireless communication.

Do not attempt to repair, disassemble, or modify the Unit by yourself. There are no serviceable parts inside and opening the Unit will void the warranty.

Remove all foreign substances such as dust or water from the terminals using a dry cloth on a regular basis. - Unplug all connectors and clean it with a dry cloth without alcohol or other solvents.

Do not pull or excessively bend the cables. Do not twist or tie the cables. Do not hook the cables over a metal object or place a heavy object on the cables. Do not pull the cables, when unplugging. Pull out the cable only by holding the plug. Do not put force on the cables in any direction when connected to the Control Unit, this can damage the Control Unit and connectors.

Before switching on the power to the Control Unit ensure that the Motors can spin freely and no harm to humans, animals or objects is possible in case the connected motors start moving.

Do not use the Control Unit if it is damaged, the isolation on the cables is damaged or it shows any abnormality like excessive heat dissipation.

It is normal that the Control Unit gets warm during operation. To avoid overheating do not cover the Control Unit with thermally insulating material and allow free airflow.



5.1 Troubleshooting

Camera does not trigger/focus when function is used.

- Please check the trigger cable if properly plugged into the control unit's CAM socket and to the camera.
- Check if the Camera is switched on.
- If focusing is not working check if the camera/lens is set to manual focus.
- Some cameras require settings in the menu to allow external trigger cable to be used, please check with the manual of your camera.

Motor does not start when function is used.

- Please check if the motor cable is properly plugged into the control unit's Motor socket and control unit is supplied by required voltage.
- Check if the power supply is connected. If only USB is connected the Control Unit may connect to the App or PC program, but the motors will not work.
- Check if supply voltage is in range (The battery may be empty.)
- Check if any error information is shown in the PC program or App.



5.2 Regulatory Hints



INSTRUCTION ABOUT THE WEEE MARK

Correct Disposal of This Product (Waste Electrical & Electronic Equipment) (Applicable in countries with separate collection systems) This marking on the product, accessories or literature indicates that the product and its electronic accessories (cables, adapters,..) should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources. Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling. Business users should contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

USA:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



Canada:

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage;
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

China:

注意！

依據 低功率電波輻射性電機管理辦法

第十二條 經型式認證合格之低功率射頻電機，

非經許可，

公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計

之特性及功能。

第十四條 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；

經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信規定作業之無線電信。

低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。